

EOSDIS Core System Project

ECS System Acceptance Test Procedures - Volume 3: Earth Observing System (EOS) Operations Center (EOC) for the ECS Project

September 1996

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Hughes Information Technology Systems
Upper Marlboro, Maryland

ECS System Acceptance Test Procedures Volume 3: Earth Observing System (EOS) Operations Center (EOC) for the ECS Project

September 1996

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SUBMITTED BY

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Preface

This document is a formal contract deliverable with an approval code 1. It requires Government review and approval prior to acceptance and use. This document is under ECS contractor configuration control. Once this document is approved, Contractor approved changes are handled in accordance with Class I and Class II change control requirements described in the EOS Configuration Management Plan, and changes to this document shall be made by document change notice (DCN) or by complete revision.

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Abstract

The ECS System Acceptance Test Procedures documents contain the specific test instructions to completely verify that ECS Release A installed at the GSFC, LaRC, and EDC DAACs, and the EOC and SMC sites satisfy the level 3 requirements documented in the Functional and Performance Requirements Specification (F&PRS).

There is a separate set of test procedures for each DAAC, the EOC and SMC. Each set of test procedures is delivered as separate volume. This volume (Volume 3) defines the ECS Acceptance Test Procedures for the Earth Observing System (EOS) Operations Center (EOC) for Release A. As a result of ECS test consolidation, some of the procedures used in EOC acceptance testing are included in the Release A Flight Operations Segment (FOS) Integration & Test Procedures for the ECS Project (DID 322/DV2).

Keywords: Acceptance test, ECS Release A, level 3 requirements, EOC

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Appendix A. Test Procedure Format

Abbreviations and Acronyms

Glossary

1. Introduction

1.1 Identification

The Acceptance Test Procedures (ATPr), Contract Data Requirement List (CDRL) item 070, whose requirements are specified in Data Item Description (DID) 411/VE1, is a required deliverable under the Earth Observing System Data and Information System (EOSDIS) Core System (ECS) Contract NAS5-60000.

The Release A ECS System Acceptance Test Procedures describe the approach the Independent Acceptance Test Organization (IATO) takes to verify level 3 ECS requirements. The Release A ECS System Acceptance Test Procedures - Volumes 1-5 contain the step by step test procedures for each Release A site. Figure 1-1 graphically depicts the Release A ECS System Acceptance Test Procedures volumes.

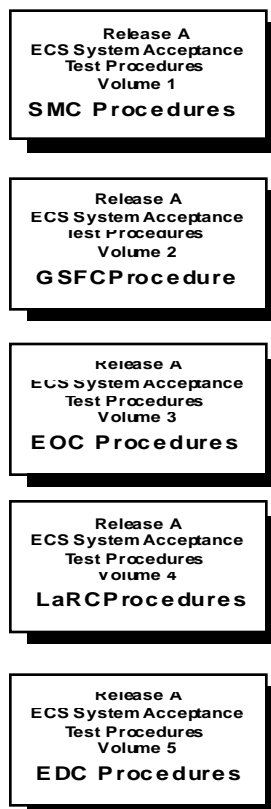


Figure 1-1. ECS System Acceptance Test Procedure Volumes

1.2 Scope

Release A of ECS supports the early operational stages of the Tropical Rainfall Measuring Mission (TRMM). Release A follows an earlier ECS delivery, referred to as Interim Release 1 (Ir1), which provided certain enterprise infrastructure in preparation for subsequent deliveries. Ir1 also provided science software integration and testing capabilities. The infrastructure delivery of ECS involves three Distributed Active Archive Centers (DAACs)-- these being the Goddard Space Flight Center (GSFC), the Langley Research Center (LaRC) and the EROS Data Center (EDC). Even though only two of the DAACs (GSFC and LaRC) directly support the TRMM effort, all three are updated at Release A. This simplifies configuration management and allows for interface testing for future ECS releases. For Release A, the Ir1 configurations of GSFC and LaRC DAACs are upgraded with major hardware and software deliveries. The EDC, which is not part of TRMM operations, receives a minor upgrade for Release A to support interface testing. Additionally, Release A provides for overall ECS system monitoring at the System Monitoring and Coordination Center (SMC) and core flight operations functionality at the EOS Operation Center (EOC) for EOS spacecraft.

This document comprises the IATO's test procedures for Release A. It contains the step-by-step procedures for implementing each formal acceptance test, including the detailed procedures for data reduction and analysis of the test results.

1.3 Purpose

The purpose of the Release A ECS System Acceptance Test Procedures is to define the procedures used to formally verify that the ECS Release A meets all specified level 3, operational, functional, performance and interface requirements. These procedures define the specific objectives, event sequences, support requirements, configuration identification, and testing procedures for each acceptance test or series of test to be performed during acceptance testing of the ECS.

1.4 Status and Schedule

The submittal of DID 411/VE1 meets the milestone specified in the Contract Data Requirements List (CDRL) for ECS Overall System Acceptance Test Procedures of NASA contract NAS5-60000. The submittal schedule is three months prior to the ECS Release A Release Readiness Review (RRR).

1.5 Organization

This document is organized in five volumes. The Release A ECS System Acceptance Test Procedures - Volumes 1 through 5 contains the step-by-step test procedures at each site.

The Release A ECS System Acceptance Test Procedures - Volumes 1-5 where-in the detailed procedures for each individual site are detailed. Sections 7-12 of Volumes 1-5 map directly to the material introduced in corresponding sections of the Release A ATPr's listed below.

- Section 1: Introduction- Provides information regarding the identification, scope, purpose, status and schedule, and organization of this document.
- Section 2: Related Documents: Provides a listing of parent documents, applicable documents, and documents which are used as source information.
- Section 3: Acceptance Test Overview- Describes Release A capabilities and provides an overview of the acceptance functional and interface tests. Acceptance test roles and responsibilities are also described.
- Section 4: Test Tools- Describes the test tools used by IATO to conduct ECS Release A System Acceptance Tests.
- Section 5: Test Execution and Coordination-Discusses the process by which formal acceptance testing is managed on a daily basis.
- Section 6: Release A Test Schedule- Depicts the overall ECS acceptance test schedule and coordination activities.

Sections 1-6 of Volumes 1-5 describes the approach that the IATO takes to Test ECS.

- Section 7: Test Site Environment- Provides an overview of the individual site test environment.
- Section 8: System Management Scenario Group- Contains the detailed procedures for the system management group of requirements.
- Section 9: Push Scenario Group- Contains the detailed procedures for the push scenario group of requirements.
- Section 10: Pull Scenario Group- Contains the detailed procedures for the pull scenario group of requirements.
- Section 11: Flight Operations Scenario Group- Contains the detailed procedures for the Flight Operations scenario group of requirements.
- Section 12: End-to-End Scenario Group- Contains the detailed procedures for the end-to-end scenario group of requirements.

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2. Related Documentation

2.1 Parent Documents

The parent documents are the documents from which the scope and content of this document are derived.

194-401-VE1-002	Verification Plan for the ECS Project, Final
409-CD-001-004	ECS Overall System Acceptance Test Plan for Release A
420-05-03	Earth Observing System (EOS) Performance Assurance Requirements for EOSDIS Core System (ECS)
423-41-01	Goddard Space Flight Center, EOSDIS Core System (ECS) Statement of Work
423-41-02	Goddard Space Flight Center, Functional and Performance Requirements Specification for the Earth Observing System Data and Information System (EOSDIS) Core System (ECS)

2.2 Applicable Documents

The following documents are referenced within this Test Procedures document, or are directly applicable, or contain policies or other directive matters that are binding upon the content of this document.

107-CD-002-XXX	Level 1 Master Schedule for the ECS Project (published monthly)
505-41-11	Goddard Space Flight Center, Interface Requirements Document Between EOSDIS Core System (ECS) and the Version 0 System, 10/95
505-41-12	Goddard Space Flight Center, Interface Requirements Document Between EOSDIS Core System (ECS) and Science Computing Facilities, 5/95
505-41-14	Goddard Space Flight Center, Interface Requirements Document Between EOSDIS Core System (ECS) and Tropical Rainfall Measuring Mission (TRMM) Ground System, 2/95
505-41-15	Goddard Space Flight Center, Interface Requirements Document Between EOSDIS the AM project for AM-1 Flight Operations, 7/95
505-41-17	Goddard Space Flight Center, Interface Requirements Document Between EOSDIS Core System (ECS) and the NASA Science Internet (NSI), 10/95

505-41-18	Goddard Space Flight Center, Interface Requirements Document Between EOSDIS and MITI ASTER GDS Project, 7/95
505-41-19	Goddard Space Flight Center, Interface Requirements Document Between the EOSDIS Core System (ECS) and the National Oceanic and Atmospheric Administration (NOAA) Affiliated Data Center (ADC), 5/95
505-41-21	Goddard Space Flight Center, Interface Requirements Document Between EOSDIS Core System (ECS) and NASA Institutional Support Systems (NISS), 5/95
505-41-32	Goddard Space Flight Center, Interface Requirements Document Between Earth Observing System Data and Information System, and the Landsat 7 System, 7/95
560-EDOS-0211.0001	Interface Requirements Document (IRD) Between the Earth Observing System (EOS) Data and Operations System (EDOS), and the EOS Ground System (EGS) Elements

2.3 Information Documents

The following documents, although not referenced herein and/or not directly applicable, do amplify or clarify the information presented in this document, but are not binding on the content of this ECS System Acceptance Test Procedures document.

222-TP-003-008	Release Plan Content Description for the ECS Project
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3. Acceptance Test Overview

The Earth Observing System (EOS) Data Information System (EOSDIS) Core System (ECS) capabilities are developed in terms of four formal releases. The first of the four formal releases include capabilities necessary to fully support the scheduled launch and ongoing operations for Tropical Rainfall Measurement Mission (TRMM), interface testing for Landsat-7, and command and control interface testing for AM-1. This first release, called Release A, supports data operations that follow at the EOS Operations Center (EOC), System Management Center (SMC) and three Distributed Active Archive Centers (DAACs). The DAACs that are activated for Release A are located at Goddard Space Flight Center (GSFC), Langley Research Center (LaRC), and the EROS Data Center (EDC).

3.1 Release A Capabilities

Release A of ECS supports the early operational stages of the Tropical Rainfall Measuring Mission (TRMM). Release A follows an earlier ECS delivery, referred to as Interim Release 1 (Ir1), which provided certain enterprise infrastructure in preparation for down stream deliveries. Ir1 also provided science software integration and testing capabilities. For Release A, the Ir1 configurations of GSFC, and LaRC are updated with major hardware and software deliveries while EDC, which is not part of TRMM operations, receives a minor update to support interface testing. Release A provides initial capabilities at the EOC and SMC, which include support to early interface testing and core FOS functionality. Table 3-1 summarizes the Ir1 capabilities and Release A enhancements.

Table 3-1. ECS Ir1 to Release A Enhancements

SITE	Release Ir1 Capabilities	New Release A Capabilities Deployed at Each Site
SMC	System Performance Monitoring	System Performance Monitoring and Analysis; WAN Management; and System Coordination
GSFC	TRMM Mission Support; VIRS Data Ingest, Ingest, Ancillary Data	TRMM Mission Support; VIRS Data Ingest, Archive & Distribution ; Ingest Ancillary Data; AM-1 Interface Testing; AM-1 MODIS Science Software I&T; VO Data Migration & Interoperability; TOMS Ozone Data Ingest and Archive; and System Resource Management
LaRC	TRMM Mission Support; TRMM CERES Data Ingest; NOAA Ancillary Data Ingest	TRMM Mission Support; TRMM CERES Data Ingest, Production, Archive & Distribution; Data Migration & Interoperability; AM-1 Interface Testing; NOAA Ancillary Data Ingest; TRMM & AM-1 CERES, and MISR and MOPITT Science Software I&T; SAGE Aerosol & Ozone Data, and ISCCP Data Ingest and Archive; and System Resource Management
EDC	Landsat-7 Interface Testing; Landsat-7 Level-0R Data Ingest	Landsat-7 Interface Testing; Landsat-7 Level-0R Data Ingest; ASTER/MODIS Science Software I&T; Ingest and Storage of Landsat-7 L0R data; and System Resource Management
EOC		AM-1 Interface Testing; ASTER GDS, SCF, NCC, EDOS, and FDF Interface Testing; core FOS functionality, and System Resource Management

3.2 Release A Acceptance Test Approach

The acceptance testing of Release A capabilities is divided into five major scenario groups: System Management, Push, Pull, Flight Operations, and End-to-End. These scenario groups identify high level ECS functionality from a users and operations viewpoint. Each group is sub-divided into scenarios that emulate the operations and user environment. Scenarios are further broken down into more manageable test sequences in which test procedures that trace to level 3 requirements are executed. The Requirements and Traceability Management (RTM) Tool is used for the purpose of tracking level 3 requirements' test status.

3.2.1 ECS Functional Tests

The complete set of ECS functions allocated to Release A are verified to ensure that the release meets those requirements needed to support TRMM and provide core functionality for the AM-1 missions. This includes verifying requirements for all features needed to support the ECS Release objectives for spacecraft operations and control, scheduling, data operations, information management and archive, science processing, networks, and system management.

Acceptance testing include the verification of certain ECS features needed to support TRMM. These features are: the ingest, archive processing, and distribution of Level-1 through Level-3 of Precipitation Radar (PR), TRMM Microwave Imager (TMI), and Visible Infrared Scanner (VIRS) instrument data; and TRMM Ground Validation (GV) data transmitted from the TSDIS, which is a production system provided by the TRMM project. Additional features include the ingest, archive, product generation, and distribution of TRMM CERES and LIS instrument data received from the SDPF.

3.2.2 Interface Acceptance Tests

Acceptance testing verifies system compliance to level 3 requirements by focusing on the objectives and capabilities specified for Release A. These capabilities are tested for functionality and performance within the boundaries of the interfaces defined for the release. The external boundary of ECS is typically at communications, data medium or graphic interfaces. For communications, these interfaces act as conduits through which input (Level-0) and output data (Level-1, Level-2, etc.), and stimuli (commands, requests, etc.) and responses (acknowledgments, data, etc.) flow. The communications interfaces to be verified for Release A include National Aeronautics and Space Administration (NASA) Science Internet (NSI), NASA Communications (NASCOM) Operational Local Area Network (NOLAN), and EOSDIS Backbone network (EBnet) where they terminate at the applicable ECS sites. At the ECS, these interfaces are physically located at the SMC and EOC; and the ECS GSFC, LaRC and EDC DAAC sites. The communications networks that are connected to the ECS terminate at two classes of external systems: data providers (whose science data are later referred to as push data) and data users (whose requests result in what later are referred to as pull data). The data providers for Release A are the Sensor Data Processing Facility (SDPF), ECS Data and Operation System (EDOS), Flight Dynamics Facility (FDF), Network Communications Center (NCC), the Landsat Processing System (LPS), and the TRMM Science Data and Information System (TSDIS). The data users for TRMM are the science user community at the DAACs and the SCFs. The node chart in Figure 3-1

depicts the interconnection of external systems with ECS. A summary of the content and carriers associated with the data flowing across ECS interfaces is shown in Table 3-2. A more complete account of each interface may be found in Interface Control Documents 209/SE1-001 through 020.

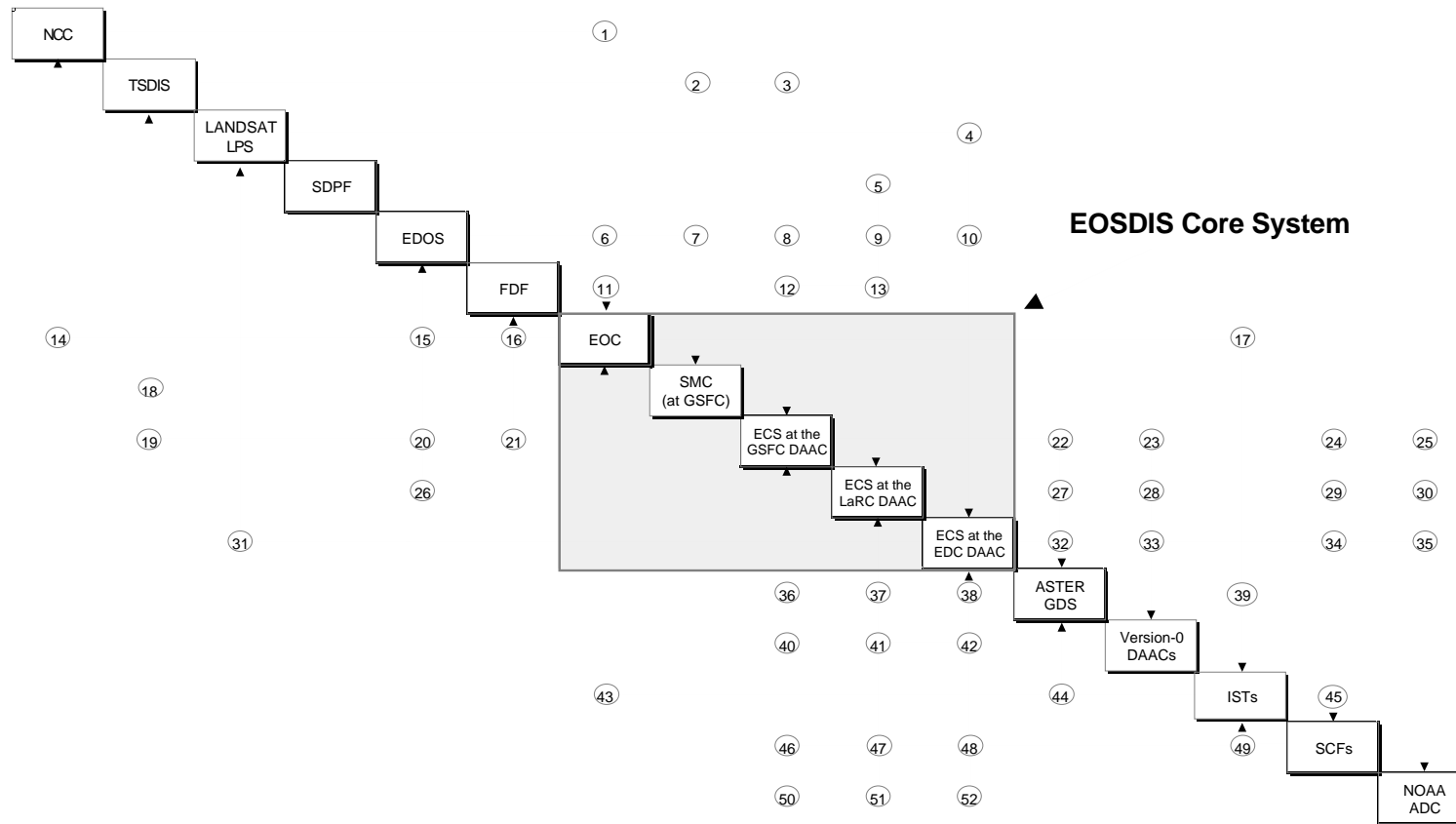


Figure 3-1. ECS Release A Interfaces with the EOS Ground System

Table 3-2. ECS Release A Data Flow Interfaces (1 of 8)

Node	Mission	Source	Destination	Carrier/ Media	Data Content	Source	Date
1	AM-1	NCC	EOC	EBnet	GCM status and disposition messages.	305-CD-040-001 530-ICD-NCCDS/ MOC, Annex 4 329-CD-001-003	Oct-95 Sep-95 Oct-95
2	TRMM	TSDIS	SMC at GSFC	Email/ Phone	Schedule Coordination & Adjudication for Data Exchange with DAACs; and Status Information.	209-CD-007-001 Section 4	Jan-95
3	TRMM	TSDIS	ECS at the GSFC DAAC	Exchange LAN	Levels 1A to 3 TMI, PR, GV, VIRS and Combined Data Products, Browse Products, and Metadata; Updated Metadata; TMI, PR, GV, VIRS, Combined Algorithms and Documentation; Reprocessing Product Schedules, and Delayed Product Status; Request for Ancillary Data.	209-CD-007-004 Figure 5-1	May-96
4	Landsat-7	Landsat LPS	ECS at the EDC DAAC	Landsat Network	Data Availability Notice; Level 0R Data; Level 0R Inventory Metadata; Level 0R Browse.	209-CD-013-003 Table 3-1	Mar-96
5	TRMM	SDPF	ECS at the LaRC DAAC	EBnet	Quicklook Data Product; Level-0 Data Products; Ephemeris Data File.	510-203.103 Table 10-3	Apr-96
6	AM-1	EDOS	EOC	EBnet	Spacecraft and instrument real time housekeeping and health and safety telemetry; Real-time and rate-buffered.	510-ICD-EDOS Table 4.2.2-1 307-CD-001-003 329-CD-001-003	Jan-96 Oct-95 Oct-95
7	AM-1	EDOS	SMC at GSFC	EBnet	Summary Performance Report.	510-ICD-EDOS/EGS	Jan-96
8	AM-1	EDOS	ECS at the GSFC DAAC	EBnet	Service Request Disposition; PDSs (Level-0 data); ADSs (Back-up Level-0 Data); PDS and ADS Delivery Records; Physical Media Unit Delivery Record; Undetected Fault Isolation.	305-CD-014-001 Table 3.2-1	Jul-95
9	AM-1	EDOS	ECS at the LaRC DAAC	EBnet	Service Request Disposition; PDSs (Level-0 data); PDS Delivery Record; Undetected Fault Isolation.	305-CD-015-001 Table 3.2-1	Jul-95
10	AM-1	EDOS	ECS at the EDC DAAC	EBnet	Level-0; Quick Look, Status; and Coordination Data.	222-TP-003-005 Section 5	Dec-94
11	AM-1	FDF	EOC	EBnet	Basic connectivity test messages.	307-CD-001-003 329-CD-001-003	Oct-95 Oct 95

Table 3-2. ECS Release A Data Flow Interfaces (2 of 8)

Node	Mission	Source	Destination	Carrier/Media	Data Content	Source	Date
12	AM-1	FDF	ECS at the GSFC DAAC	NOLAN	Repaired Orbit Data.	305-CD-014-001 Table 3.2-1	Jul-95
13	AM-1	FDF	ECS at the LaRC DAAC	NOLAN	Refined Orbit/Attitude data.	305-CD-015-001 Table 3.2-1	Jul-95
14	AM-1	EOC	NCC	EBnet	Ground Configuration Message Requests.	305-CD-040-001 530-ICD-NCCDS/ MOC, Annex 4 329-CD-001-003	Oct-95 Sep-95 Oct-95
15	AM-1	EOC	EDOS	EBnet	Spacecraft and instrument commands.	510-ICD-EDOS Table 4.2.2-1 307-CD-001-003 329-CD-001-003	Jan-96 Oct-95 Oct-95
16	AM-1	EOC	FDF	EBnet	Basic connectivity test messages.	307-CD-001-003 329-CD-001-003	Oct-95 Oct-95
17	AM-1	EOC	ISTs	NSI	Spacecraft and instrument telemetry.	305-CD-040-001 307-CD-001-003 329-CD-001-003	Oct-95 Oct-95 Oct-95
18	TRMM	SMC at GSFC	TSDIS	Email/Phone	Schedule Coordination & Adjudication for Data Exchange with DAACs; and Status Information.	209-CD-007-001 Section 4	Jan-95
19	TRMM	ECS at the GSFC DAAC	TSDIS	Exchange LAN	Levels 1A to 3 TMI, PR, GV, VIRS, and Combined Data Products for Reprocessing; Ancillary Data for Processing and Reprocessing; TRMM Orbit Ephemeris; TRMM Level-0 Housekeeping data.	209-CD-007-004 Figure 5-1	May-96
20	AM-1	ECS at the GSFC DAAC	EDOS	EBnet	Service Requests (Back-up data requests); Fault report; Fault Isolation Request; Level-0 data.	305-CD-014-001 Table 3.2-1	Jul-95
21	AM-1	ECS at the GSFC DAAC	FDF	NOLAN	Repaired/Retained Orbit Data Request.	305-CD-014-001 Table 3.2-1	Jul-95
22	AM-1	ECS at the GSFC DAAC	ASTER GDS	NSI	Algorithms, Source Code, Documentation, SCF Interaction; Level 1 Data Products; Product Requests; Data Products; Status; System and Network Management; User Authentication, User Data Search & Request, User Product Requests, Status.	209-CD-002-003 Figure 3-1	Mar-96

Table 3-2. ECS Release A Data Flow Interfaces (3 of 8)

Node	Mission	Source	Destination	Carrier/Media	Data Content	Source	Date
23	All Missions	ECS at the GSFC DAAC	Version-0 DAACs	EBnet	Directory Search Requests; Inventory Search Requests; Acknowledgments; Browse Request; Product Request; Statistics; Quit; Pong.	209-CD-011-004 Figure 4-2	Mar-96
24	AM-1	ECS at the GSFC DAAC	SCFs	NSI	ECS Software Package; I & T Requirements; Science Software Integration Test Status; Data Availability notices; Operational Science Data Production Software Package; Test Product Availability Message during Software I & T; QA Notification Specification Acknowledgement; Data Quality Request Notification; Data Delivered for QA; Processing Status; Resource usage; Reprocessing Request Acknowledgement; Product history.	209-CD-005-005 Figure 3.1-1	Mar-96
25	AM-1	ECS at the GSFC DAAC	NOAA ADC	NSI	Inventory Search; Browse Request; Product Request; Guide Search.	209-CD-006-005 Figure 5-1	Mar-96
26	AM-1	ECS at the LaRC DAAC	EDOS	Ebnet	Fault report; Fault Isolation Request; Level-0 data.	305-CD-015-001 Table 3.2-1	Jul-95
27	AM-1	ECS at the LaRC DAAC	ASTER GDS	NSI	Algorithms, Source Code, Documentation, SCF Interaction; Level 1 Data Products; Product Requests; Data Products; Status; System and Network Management; User Authentication, User Data Search & Request, User Product Requests, Status.	209-CD-002-003 Figure 3-1	Mar-96
28	All Missions	ECS at the LaRC DAAC	Version-0 DAACs	EBnet	Directory Search Requests; Inventory Search Requests; Acknowledgments; Browse Request; Product Request; Statistics; Quit; Pong.	209-CD-011-004 Figure 4-2	Mar-96

Table 3-2. ECS Release A Data Flow Interfaces (4 of 8)

Node	Mission	Source	Destination	Carrier/Media	Data Content	Source	Date
29	AM-1	ECS at the LaRC DAAC	SCFs	NSI	ECS Software Package; I & T Requirements; Science Software Integration Test Status; Data Availability notices; Operational Science Data Production Software Package; Test Product Availability Message during Software I & T; QA Notification Specification Acknowledgement; Data Quality Request Notification; Data Delivered for QA; Processing Status; Resource usage; Reprocessing Request Acknowledgement; Product history.	209-CD-005-005 Figure 3.1-1	Mar-96
30	AM-1	ECS at the LaRC DAAC	NOAA ADC	NSI	Inventory Search; Browse Request; Product Request; Guide Search.	209-CD-006-005 Figure 5-1	Mar-96
31	Landsat-7	ECS at the EDC DAAC	Landsat LPS	Landsat Network	Data Transfer Acknowledgment.	209-CD-013-003 Table 3-1	Mar-96
32	AM-1	ECS at the EDC DAAC	ASTER GDS	NSI	Algorithms, Source Code, Documentation, SCF Interaction; Level 1 Data Products; Product Requests; Data Products; Status; System and Network Management; User Authentication, User Data Search & Request, User Product Requests, Status.	209-CD-002-003 Figure 3-1	Mar-96
33	All Missions	ECS at the EDC DAAC	Version-0 DAACs	EBnet	Directory Search Requests; Inventory Search Requests; Acknowledgments; Browse Request; Product Request; Statistics; Quit; Pong.	209-CD-011-004 Figure 4-2	Mar-96

Table 3-2. ECS Release A Data Flow Interfaces (5 of 8)

Node	Mission	Source	Destination	Carrier/Media	Data Content	Source	Date
34	AM-1	ECS at the EDC DAAC	SCFs	NSI	ECS Software Package; I & T Requirements; Science Software Integration Test Status; Data Availability notices; Operational Science Data Production Software Package; Test Product Availability Message during Software I & T; QA Notification Specification Acknowledgement; Data Quality Request Notification; Data Delivered for QA; Processing Status; Resource usage; Reprocessing Request Acknowledgement; Product history.	209-CD-005-005 Figure 3.1-1	Mar-96
35	AM-1	ECS at the EDC DAAC	NOAA ADC	NSI	Inventory Search; Browse Request; Product Request; Guide Search.	209-CD-006-005 Figure 5-1	Mar-96
36	AM-1	ASTER GDS	ECS at the GSFC DAAC	NSI	Algorithms, Source Code, Documentation, SCF Interaction; Level 1 Data Products; Product Requests; Data Products; Status; System and Network Management; User Authentication, User Data Search & Request, User Product Requests, Status.	209-CD-002-003 Figure 3-1	Mar-96
37	AM-1	ASTER GDS	ECS at the LaRC DAAC	NSI	Algorithms, Source Code, Documentation, SCF Interaction; Level 1 Data Products; Product Requests; Data Products; Status; System and Network Management; User Authentication, User Data Search & Request, User Product Requests, Status.	209-CD-002-003 Figure 3-1	Mar-96

Table 3-2. ECS Release A Data Flow Interfaces (6 of 8)

Node	Mission	Source	Destination	Carrier/Media	Data Content	Source	Date
38	AM-1	ASTER GDS	ECS at the EDC DAAC	Tape	Algorithms, Source Code, Documentation, SCF Interaction; Level 1 Data Products; Product Requests; Data Products; Status; System and Network Management; User Authentication, User Data Search & Request, User Product Requests, Status.	209-CD-002-003 Figure 3-1	Mar-96
39	AM-1	ASTER GDS	ISTs (ASTER only)	ASTER LAN	One-day schedule; Short-term schedule.	209-CD-002-003 307-CD-001-003 329-CD-001-003	Mar-96 Oct-95 Oct-95
40	All Missions	Version-0 DAACs	ECS at the GSFC DAAC	Ebnet	Directory Search Results; Inventory Search Results; ftp and Integrated Browse Results; Product Results; Quit; Pong; NCEP Ancillary data.	209-CD-011-004 Figure 4-2	Mar-96
41	All Missions	Version-0 DAACs	ECS at the LaRC DAAC	EBnet	Directory Search Results; Inventory Search Results; ftp and Integrated Browse Results; Product Results; Quit; Pong.	209-CD-011-004 Figure 4-2	Mar-96
42	All Missions	Version-0 DAACs	ECS at the EDC DAAC	EBnet	Directory Search Results; Inventory Search Results; ftp and Integrated Browse Results; Product Results; Quit; Pong.	209-CD-011-004 Figure 4-2	Mar-96
43	AM-1	ISTs	EOC	NSI, EBnet for ASTER IST	Instrument planning, Instrument Microprocessor Memory Loads.	305-CD-040-001 307-CD-001-003 329-CD-001-003	Oct-95 Oct-95 Oct-95
44	AM-1	ISTs (ASTER only)	ASTER GDS	ASTER LAN	Basic connectivity test messages.	307-CD-001-003 329-CD-001-003	Oct-95 Oct-95
45	AM-1	ISTs	SCFs	Site Campus Networks	Instrument Analysis Results.	305-CD-040-001 307-CD-001-003 329-CD-001-003	Oct-95 Oct-95 Oct-95

Table 3-2. ECS Release A Data Flow Interfaces (7 of 8)

Node	Mission	Source	Destination	Carrier/Media	Data Content	Source	Date
46	AM-1	SCFs	ECS at the GSFC DAAC	NSI	Algorithms; Remote Access Session Dialog; Request for Operational Data Production Software Package; Request for Test Products after Software Integration and Test; Test Product Reviews; QA Notification Specification; QA Metadata Updates; Request for Processing Status; Request for Resource Usage; Reprocessing Requests.	209-CD-005-005 Figure 3.1-1	Mar-96
47	AM-1	SCFs	ECS at the LaRC DAAC	NSI	Algorithms; Remote Access Session Dialog; Request for Operational Data Production Software Package; Request for Test Products after Software Integration and Test; Test Product Reviews; QA Notification Specification; QA Metadata Updates; Request for Processing Status; Request for Resource Usage; Reprocessing Requests.	209-CD-005-005 Figure 3.1-1	Mar-96
48	AM-1	SCFs	ECS at the EDC DAAC	NSI	Algorithms; Remote Access Session Dialog; Request for Operational Data Production Software Package; Request for Test Products after Software Integration and Test; Test Product Reviews; QA Notification Specification; QA Metadata Updates; Request for Processing Status; Request for Resource Usage; Reprocessing Requests.	209-CD-005-005 Figure 3.1-1	Mar-96
49	AM-1	SCFs	ISTs	Site Campus Networks	Instrument Microprocessor Memory Loads.	305-CD-040-001 307-CD-001-003 329-CD-001-003	Oct-95 Oct-95 Oct-95
50	AM-1	NOAA ADC	ECS at the GSFC DAAC	NSI	Advertising Information; Dependent Validates Update; Inventory Search Result; Integrated Browse Result; FTP Browse Result; Product Result Message; Guide Result; NCEP Ancillary data.	209-CD-006-005 Figure 5-1	Mar-96

Table 3-2. ECS Release A Data Flow Interfaces (8 of 8)

Node	Mission	Source	Destination	Carrier/Media	Data Content	Source	Date
51	AM-1	NOAA ADC	ECS at the LaRC DAAC	NSI	Advertising Information; Dependent Valid Update; Inventory Search Result; Integrated Browse Result; FTP Browse Result; Product Result Message; Guide Result.	209-CD-006-005 Figure 5-1	Mar-96
52	AM-1	NOAA ADC	ECS at the EDC DAAC	NSI	Advertising Information; Dependent Valid Update; Inventory Search Result; Integrated Browse Result; FTP Browse Result; Product Result Message; Guide Result.	209-CD-006-005 Figure 5-1	Mar-96

The capability of the ECS to communicate and transfer data over the external interfaces in accordance with the F&PRS and applicable IRDs are verified during acceptance tests. Data content flowing across Release A interfaces include TRMM data from SDPF and simulated AM-1 data from EDOS; ancillary data from NOAA and FDF; schedule data to/from SDPF, ground configuration messages to/from NCC, Level-1 through Level-3 TRMM data from TSDIS; Landsat-7 Level-0, metadata and browse data from the Landsat LPS; and selected Level-0 through Level-4 to the SCFs. The context chart in Figure 3-2 graphically depicts Release A key interfaces between GSFC and LaRC. The context chart in Figure 3-3 graphically depicts the Release A Landsat-7 and AM-1 key interfaces. The capability of the ECS to provide TRMM pre-launch ground system end-to-end test support, and AM-1 and Landsat-7 interface testing support are verified in acceptance tests for Release A. Tests to verify two-way inter-operability with the Version-0 system and migration and/or access of Version 0 data archives are also conducted as well as one-way inter-operability with NOAA.

Command and control interfaces to support AM-1 early interface testing are conducted. These tests include EOC planning, scheduling, command, control and monitoring of the AM-1 spacecraft; and CSMS system management and communications infrastructure.

The interfaces needed to support early Landsat-7 interface testing are also verified. These interfaces are those needed for: the receipt and storage of Landsat-7 level-0R data (viewable image data with radiometric and geometric information appended but not applied) at the EDC DAAC and the receipt and storage of Landsat-7 metadata and browse data at the EDC DAAC.

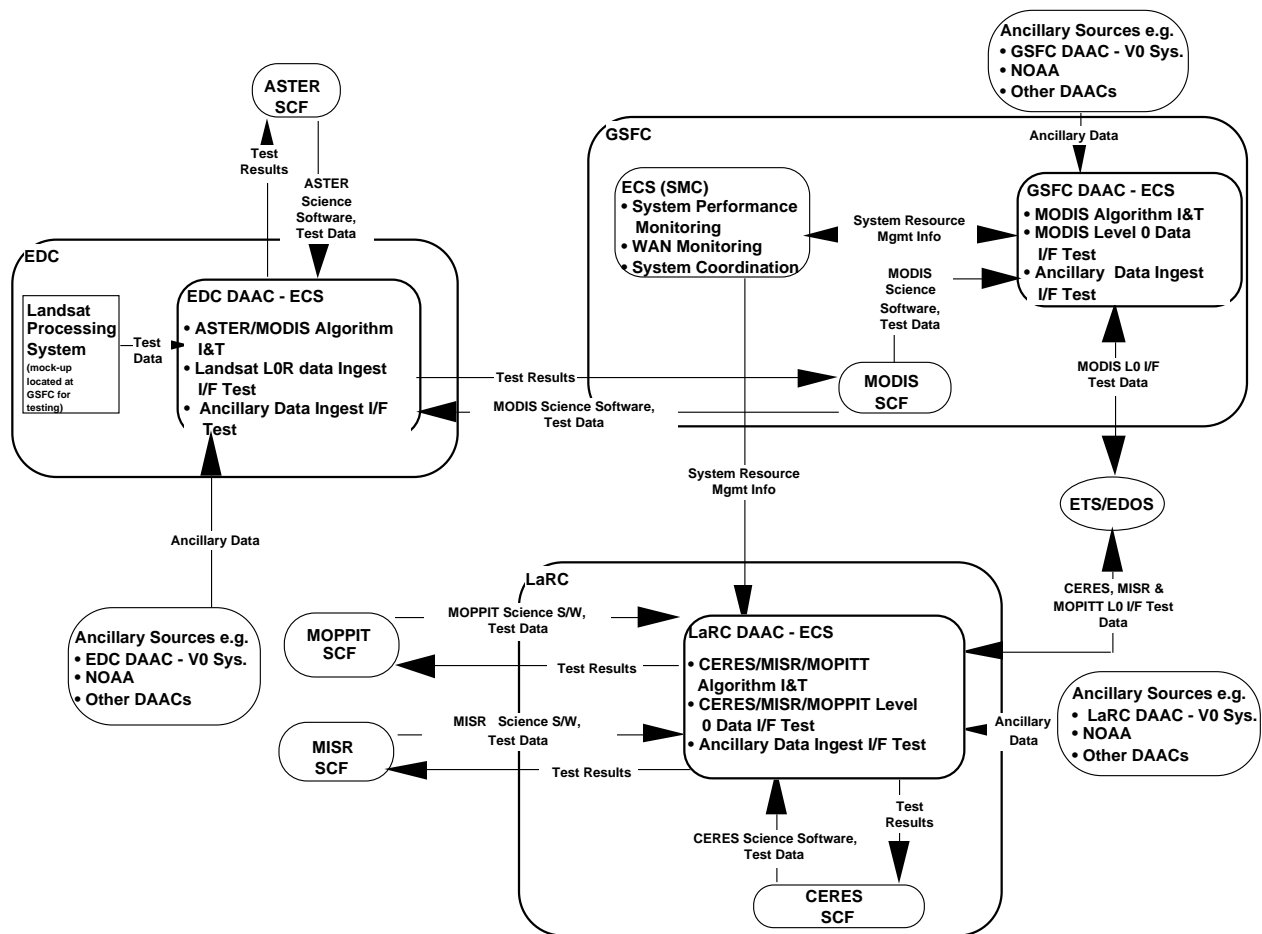


Figure 3-2. Release A Key Interfaces Between GSFC and LaRC

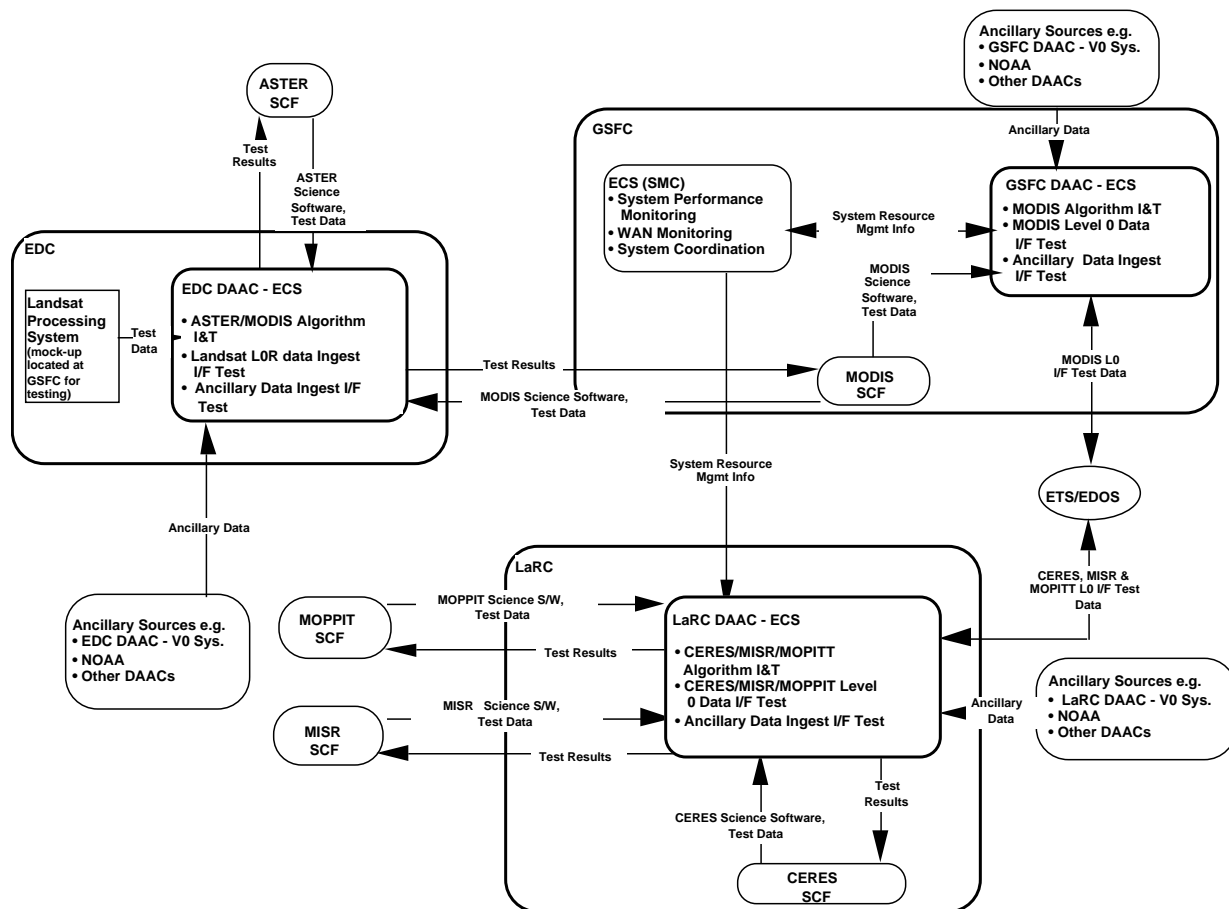


Figure 3-3. Release A Landsat-7 and AM-1 Key Interfaces

3.3 Acceptance Test Roles and Responsibilities

Acceptance testing is a formal process that requires the coordination of different organizations. Each organization has well defined roles and responsibilities for the acceptance testing process:

Independent Acceptance Test Organization (IATO): The IATO assigns a test manager to coordinate and run acceptance testing. The IATO also provides test conductors to execute the step-by-step procedures that are defined in the ATPr. Test conductors also write, collect, and track nonconformance reports and determine the impact of these reports on test plans, scenarios, test cases, and procedures.

Quality Office (QO): The QO provides a representative to witness the execution of acceptance testing. The QO also tracks the status of nonconformance reports and reviews them prior to closure to ensure that the required actions have been completed.

Configuration and Data Management Organization: The Configuration Management Office (CMO) coordinates with the IATO to capture the test configuration of software, hardware, test data, test tools, and documentation prior to test execution to ensure repeatability. They also capture and retain test outputs (e.g., test logs, data, and modified procedures) and distribute copies for test analysis. The product baseline, which is established prior to the RRR and includes test reports, is maintained by the CMO.

ECS Maintenance & Operations (M&O) Organization: As part of acceptance testing at the test site, the site manager assigns M&O personnel who are integrated into the test team to help execute acceptance tests. The early first-hand involvement of the site manager and his operations personnel in site acceptance testing provides the M&O Team with early visibility into each new release and hastens a smooth transition. This involvement and familiarity with ECS software in the stages before release to the user base greatly enhance the effectiveness and productivity of the M&O staff and positions a highly competent and responsive user support staff on-site at the DAACs. In addition, during the M&O phase, the IATO assists by providing benchmark tests to verify operational performance of the ECS system. The IATO provides guidance in acceptance testing during the verification of approved changes and enhancements.

ESDIS SI&T Contractor: The ESDIS Integration Contractor and the Independent Verification and Validation (IV&V) Contractor witness and monitors acceptance testing, as directed by the ESDIS SI&T, and the IV&V Contractor.

The Acceptance Test Team (ATT) consists of various personnel who assist the IATO Test Conductor during the acceptance testing phases. Listed below are the DAAC role players and a brief description of their responsibilities.

DAAC M&O Staff: Performs maintenance and operations activities, including hardware installations.

Network Analyst (NA): Performs network functions, including monitoring the network's performance and integrity.

Performance Manager (PM): Addresses system performance issues and concerns.

Resource Manager (RM): Manages ECS site resources.

System Administrator (SA): Performs overall system maintenance, including system backups and software upgrades.

Data Pull Technician: Manages ingest, pull and processing activities. (DAAC)

Production Planner: Populates and maintains the production planning database. (DAAC)

Production Scheduler: Reviews, approves and activates the daily production schedule. (DAAC)

Data Ingest Technician: Oversees ingest activities including the handling of physical media (e.g., mounting tapes) from which input data are read. Responsibilities also includes verifying that all data reported on data availability schedules, product delivery notices, etc. are received, validated, accounted for, and archived. (DAAC)

Data Distribution Technician: Oversees distribution activities including handling of physical media (e.g., mounting tapes) onto which ECS data are written. (DAAC)

Science Software Integration Test Team (SSITT): Verifies that any and all updates to science software are thoroughly tested and verified before being permanently installed at the DAACs.

Listed below are the EOC role players and a brief description of their responsibilities.

Flight Operations Team (FOT): Executes activities performed at the EOC workstations including system initialization, scheduling, commanding, telemetry, and analysis activities. This teams consists of the FOT Planner/Scheduler, FOT Operations Coordinator, FOT Spacecraft Activity Controller, FOT Spacecraft Evaluator, and FOT Instrument Evaluator. Listed below is a brief description of responsibilities.

FOT Planner/Scheduler -- Performs spacecraft and instrument command loading and schedule generation. This includes receiving planning and scheduling requests, instrument microprocessor memory loads, and command activity definitions from the Instrument Operations Teams (IOTs).

FOT Operations Coordinator -- Coordinates operational tests and deliveries of FOS software and the project database.

FOT Spacecraft Activity Controller -- Responsible for EOC ground system elements, hardware, software, communications links, command capability, and Local Site Manager (LSM) functions. This includes controlling and verifying ground script execution, verifying commands and load contents, transmitting and verifying commands and load uplinks, and monitoring ground system performance.

FOT Operations Controller -- Responsible for real-time interface coordination, approving real-time command uplinks, and resolving real-time anomalies.

FOT Spacecraft Evaluator -- Monitors spacecraft subsystems during real-time operations and assists in spacecraft trend analysis and anomaly recognition and resolution. This includes reviewing spacecraft activity logs and monitoring ground script execution, spacecraft command activity, and spacecraft health and safety.

FOT Instrument Evaluator -- Monitors and analyzes instruments during real-time operations and assists in instrument trend analysis and anomaly recognition and resolution. This includes reviewing activity logs and monitoring ground script execution, instrument command activity, and instrument health and safety.

FOT Database Manager -- Responsible for database administration of the project database and operational data files (ODFs), maintaining data base access, validating user access/privileges, and investigating/documenting violations.

Instrument Operations Team (IOT) -- Executes activities performed at the CERES, MISR, MODIS, MOPITT and ASTER instrument workstations. This team consists of the IOT Planner/Scheduler and IOT Instrument Evaluator. These positions are not necessarily the actual positions utilized at Instrument Support Terminals (ISTs), but rather they represent the two major FOS-related roles accomplished at ISTs.

IOT Planner/Scheduler -- Provides the FOT with planning and scheduling requests, instrument microprocessor memory loads, and command activity definitions.

IOT Instrument Evaluator -- Performs real-time instrument command and telemetry monitoring and analysis. Responsible for instrument anomaly detection and contingency procedure execution, instrument command load validation, and instrument performance and trend analysis.

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4. Test Tools

This section identifies and describes the test tools (COTS and custom coded software) used in the execution of the Release A ECS Acceptance Test and the generation of data sets. The tools for requirements traceability, computer aided software test and performance, configuration management, network status and monitoring, and external interface simulators are discussed below. Table 4-1 summarizes the test tool suite available for Release A acceptance tests. Figure 4-1 shows the test tool categories used to exercise Release A acceptance tests.

Table 4-1. Release A Test Tool Descriptions

TYPE	TOOL	DESCRIPTION
Requirements Traceability Tool	RTM	The Requirements and Traceability Management tool provides an audit trail that enables multiple requirements to be traced.
Capture and Playback Tool	XRunner	XRunner is an automated software testing system for X window applications. XRunner automates the full range of software testing needs. Some of the gained functionality includes: output synchronization, text recognition, and a high-level testing mode that operates directly on GUI objects.
Automated Client/Server Testing System	Load Runner	LoadRunner is an automated testing system for client/server applications on UNIX/X platforms. By running multiple users in parallel off the server, LoadRunner enables the automation of load testing, performance testing, and system tuning.
Configuration Management Tool	Clear Case	Clear Case uses Version Object Base (VOB) to store the software versions. A VOB is a virtual directory tree of sources and other objects that is mounted like a disk partition. A project may have many VOBs. Any changes made by the developer after the software has been frozen will be conducted on a branch. The test organizations are responsible for merging the fixes (branches).
Nonconformance Reporting and Corrective Action Tool	DDTS	DDTS is a UNIX change management and bug tracking system that racks and manages changes throughout the life cycle of a hardware or software product from initial requirements planning to obsolescence in the field. DDTS works in conjunction with ClearCase.
Network Management Framework	HP Open View	HP OpenView is used to monitor any device that supports the Simple Network Management Protocol (SNMP). This tool will aid us in determining the status of the network and the devices on the network.
Network Analyzer/Monitor	Network Analyzer/ Sniffer	The Sniffer Network Analyzer assist in performance testing and monitors and generates traffic on Ethernet and FDDI networks.
Network Performance Tool	Netperf	Netperf is a benchmark tool which measures various aspects of network performance, primarily focusing on bulk data transfer and request/response performance using either the TCP or UDP and the Berkeley Sockets interface.
Source Simulator	TRMM/ TSDIS I/F Simulator	The TRMM I/F Simulator provides the basic protocol and interface functions employed by the SDPF/TSDIS.
EOSDIS Test System	ETS	ETS provides the capabilities to simulate EOS AM-1 spacecraft and instrument low rate telemetry data and high rate science data for the EOC and DAACs. The ETS also simulates the EDOS interface with the ECS.

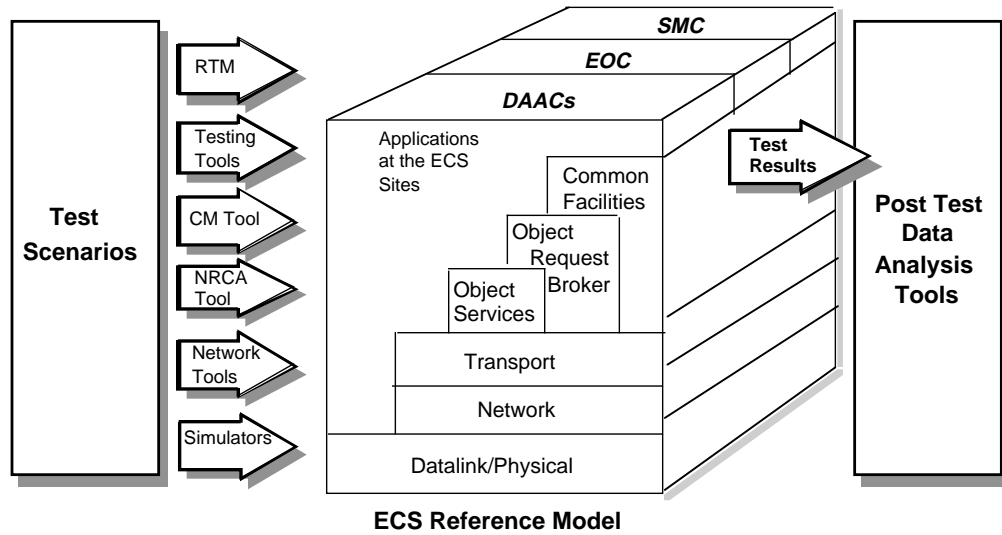


Figure 4-1. Release A Test Tool Integration

4.1 Requirements Traceability

The Requirements and Traceability Management (RTM) tools provides an audit trail for ECS requirements. This data dictionary provides definitions of classes and attributes in RTM database. Figure 4-2 depicts the RTM Class Definition and Table 4-2 provides a definition of each class.

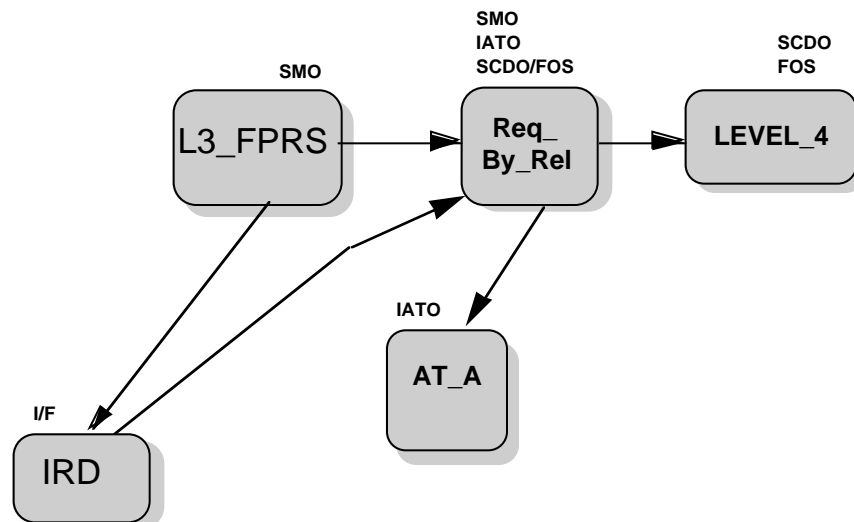


Figure 4-2. RTM Classes

Table 4.2. RTM Class Definitions

CLASS	DEFINITION
L3_FPRS	Contains the Level 3, Functional and Performance Requirements Specifications received from GSFC 07/94 (423-41-02). Objects in this class can be mapped to objects in LEVEL_2, IRD, itself, and REQ_BY_REL classes. All relationships are defined as many-to-many relationship.
REQ_BY_REL	Contains requirements allocated for each formal release and are expanded from L3_FPRS and IRD classes. It is used by development engineers to develop the Level 4 requirements. Objects in this class are mapped to objects in LEVEL_4, CCR, IRD, L3_FPRS, AT_A, AT_B, IT_Ir1, IT_A, IT_B, and IT_FOS classes. All relationships are defined as many-to-many relationships.
LEVEL_4	Contains Level 4 requirements which were expanded from the REQ_BY_REL class. Objects in this class are mapped to objects in REQ_BY_REL, IT_FOS, IT_A, IT_Ir1, IT_B, COTS, CCR, and COMPONENT classes. All relationships are defined as many-to-many relationship.
AT_A	Contains the system acceptance test sequences and test cases for A as identified in Acceptance Test Plan (ATP) and Acceptance Test Procedures. Objects in this class are mapped to objects in REQ_BY_REL class. Relationship between two classes is defined as many-to-many relationship.
IRD	Contains external interface requirements specified in Interface Requirements Documents (IRDs). Objects in this class are mapped to objects in L3_FPRS, CCR, and REQ_BY_REL classes. All relationships between classes are defined as many-to-many relationship.

4.2 Computer Aided Software Test and Performance Tools

The Mercury XRunner and LoadRunner are computer aided software test and performance test tools used to assist in the automation of testing. XRunner is designed to automate the test process by capturing, in a script file, keyboard, mouse input and system under test (SUT) responses, and then playing back those inputs and comparing the results to those stored in an expected results directory. LoadRunner is used to simulate a large number of actual users, in order to measure the response time of a server in a client/server application. Both tools offer sophisticated programming capabilities through a C based language called Test Script Language (TSL), that can be used to drive the system under test much more extensively than would be possible with manual testing. It also offers the virtue of repeating the test sequence with fidelity. The XRunner and LoadRunner tools also provide very reliable playback of user input. Specific usage of XRunner and LoadRunner in ECS acceptance tests are discussed below.

4.2.1 XRunner Usage

The primary use of the XRunner tool is the automation of functional tests that involve heavy use of graphical user interfaces. Examples of such user interfaces are the Release A desktop Graphical User Interface (GUI), DAAC or SMC operator screens, and EOC operator screens.

4.2.2 LoadRunner Usage

LoadRunner is utilized for all response time testing that involves the Release A desktop GUI and during End-to-End tests that involve large numbers of test and operations personnel at multiple sites.

4.2.3 Test Execution Reports

Upon completion of a test script execution, both XRunner and LoadRunner automatically generate test execution reports. LoadRunner generates performance graphs for analysis.

4.3 Configuration Management Tools

The ECS Configuration Management Organization (CMO) is responsible for the management and control of the Software Development Library (SDL), the Non-Conformance Reporting and Corrective Action (NRCA) System, and the baseline configuration management of hardware and software. The CMO uses two software tools to support its effort: ClearCase and Distributed Defect Tracking System (DDTS).

4.3.1 ClearCase

The CMO utilizes ClearCase to manage and control the SDL which is the central repository for ECS software including test verification items. ClearCase, an automated software tracking tool, manages multiple versions of evolving software components; tracks which versions were used in software builds; performs builds of individual programs or entire releases according to user-defined version specifications; and enforces site-specific development policies. ClearCase scripts are provided by CMO to be used throughout the software development life cycle in order to standardize and automate the tracking of the information in the SDL. The project instruction PI CM-1-019 Software Development Library, describes the SDL, the role of ClearCase in the SDL, and the associated ClearCase scripts.

The following test items are stored and baselined by the CMO, via the Software Turnover Process, as they are finalized.

- Verification documents, including test plans, procedures, scripts, and reports.
- Test data sets, software and hardware configuration, including test tools.
- Unit-tested components, data sets, Segment hardware configuration, and COTS software, as described in COTS Process Model, PI SD-1-013.
- Verified Segment/element threads and builds.
- Verified system builds
- Integration system build for a release.
- Evaluation of test results

The items are retrieved from the SDL, via ClearCase when required to perform various verification activities at the sites.

The ECS policies and procedures for baselining test items and retrieving test items from CMO is defined in PI CM-1-025, Software Development Handbook.

Since Acceptance Testing of the ECS is conducted within a baselined configured environment, ClearCase is installed at each test site; and CMO electronically deploys the binary files (executable) of ECS software, at each test site, from the ECS Development Facility (EDF). In order to maintain the integrity of the test script and test data, CMO deploys IATO's test scripts and test data, in the same manner they deploy ECS binary files. This allows the Acceptance Tester, at each test site, to maintain a baseline of changes to the test script and/or test data for the purpose of work around.

4.3.2 Distributed Defect Tracking System (DDTS)

The DDTS is a software tool used to support the NRCA system for the CMO. The DDTS records nonconformance's and reflects the progress of nonconformance reports through resolution and captures necessary information to document that progress. Through the production of management reports, DDTS provides management visibility and metrics to insure that NCRs are being worked in a timely and effective manner. The policies and procedures governing the usage of DDTS on ECS are defined in the Non-Conformance Reporting project instruction (PI), SD-1-014.

The NRCA system is the process for identifying, investigating, and resolving problems with the ECS during development, integration, installation, and acceptance test. To facilitate disposition and resolution of problems, the NRCA system and its processes emphasize tracking of responsibility, effective communication and delegation of authority. The NRCA system utilizes the DDTS to record and track software nonconformances. DDTS is customized by ECS to accurately reflect the progress of NCRs through resolution and captures necessary information to document that progress. Through the production of management reports, DDTS provides management visibility and metrics to insure that NCRs are being worked in a timely and effective manner.

4.4 Network Status and Monitoring

The three network tools utilized in acceptance tests are the HP OpenView, Sniffer Network Analyzer, and Netperf. Each are described below.

4.4.1 HP OpenView

The HP OpenView is a network tool which monitors and controls the entire network environment at each ECS site. As a diagnostic tool, it has the capability to isolate faults quickly. The tool, which resides on the Local System Management (LSM) at each ECS test site, allows the user to display a map of the network environment at that local site for the LSM and the maps of all sites at the SMC. These maps are real-time interactive graphical representations which allow the user to detect network problems as they occur without having to update or refresh the display screen, and to diagnose network connectivity. The tool allows the user to create submaps of the map which can

be as small as a software component on the system. The Acceptance Test Team (ATT) utilizes this tool to introduce systems and/or network faults to the system.

4.4.2 Network Analyzer/Sniffer

The Network Analyzer/Sniffer is a performance testing tool which monitors and generates traffic on Ethernet and FDDI networks.

4.4.3 Netperf

Netperf is a benchmark tool which measures various aspects of network performance. Its primary focus is on bulk data transfer and request/response performance using either the TCP or UDP and the Berkeley Sockets interface.

4.5 External Interface Simulators

External interface simulators are used during acceptance testing when the real interfacing system is not available. For Release A, the simulators used for acceptance testing are described below.

4.5.1 TRMM Simulator (TRMMSIM)

The TRMM Simulator (TRMMSIM) is a subsystem of the DDF External Simulator (DESIM). The TRMMSIM provides the capability to test the ECS ability to ingest data from TSDIS and Pacor II (SDPF), and to send data to TSDIS. In order to perform these two tasks, the simulator consists of a consume part and a source part. The consume part of the simulator provides the capability to send a DAN and its associated data to, and receive a DAN and its associated data from an ECS DAAC.

The TRMMSIM operates in two modes, interactive and non-interactive. The interactive mode allows the user to modify and send message types (Authentication Response, DRVR, DDN, and DDA). This mode is useful when testing the interface for error handling. The non-interactive mode generates and sends the appropriate message type.

4.5.2 EOSDIS Test System (ETS)

The ETS is primarily designed to support ECS Release B and EOS Ground System (EGS) testing. For Release A, pending availability, the Low Rate System and the Multimode Portable Simulator is used for EOC testing. In this configuration, ETS provides simulated telemetry data.

4.6 Test Data

A variety of test data is required to exercise the Release A system at each site. This test data will be used in conjunction with the simulators described above to stimulate the system. Table 4-3 summarizes the missions, data sources and destinations and content required for Release A testing. Each of the site specific volumes contains detailed lists of test data sets.

Real test data provided by the instrument teams is used whenever possible. In situations where real data is not available, simulated data or similar heritage data is used for testing. The test data is validated and placed under configuration control prior to test execution.

Table 4-3. Release A Data Sources, Destination, and Data Content (1 of 2)

Mission	Source	Destination	Data Content	Test Data Source/Contact
AM-1	Aster GDS	ECS at the EDC DAAC	Algorithms; Level-1A&1B Data; Expedited Products; Product Status; and User Data Search&Order Dialog.	ESDIS Test Data Working Group
AM-1	Aster GDS	SMC at GSFC	Schedule; and Status Information.	ESDIS Test Data Working Group
AM-1	Aster GDS	EOC	Planning; Scheduling.	ESDIS Test Data Working Group
AM-1	EDOS	EOC	Real-Time Telemetry and Accounting.	ETS/GTSIM
AM-1	EDOS	ECS at the GSFC DAAC	Level-0;Expedited Telemetry, Status; and Coordination Data.	ETS/ESDIS Test Data Working Group
AM-1	EDOS	ECS at the LaRC DAAC	Level-0;Expedited Telemetry, Status; and Coordination Data.	ETS/ESDIS Test Data Working Group
AM-1	EDOS	ECS at the EDC DAAC	Level-0;Expedited Telemetry, Status; and Coordination Data.	ETS/ESDIS Test Data Working Group
AM-1	EDOS	SMC at GSFC	Status; and Coordination Data.	ETS/ESDIS Test Data Working Group
AM-1	FDF	EOC	Basic Connectivity Test Messages	TICTOC/FDF ENGINEERING ORG
AM-1	FDF	ECS at the LaRC DAAC	Repaired & Refined Orbit and Attitude Information.	TICTOC/FDF ENGINEERING ORG
AM-1	FDF	ECS at the EDC DAAC	Repaired & Refined Orbit and Attitude Information.	TICTOC/FDF ENGINEERING ORG
AM-1	FDF	ECS at the GSFC DAAC	Repaired & Refined Orbit and Attitude Information.	TICTOC/FDF ENGINEERING ORG
Landsat-7	Landsat LPS	ECS at the EDC DAAC	Directory & Guide Information; Level-0R Data.	VO DAACS
AM-1	NCC	EOC	Ground Configuration Messages	NCC Test System
TRMM	NOAA ADC	ECS at the GSFC DAAC	Ancillary and Correlative Data	Currently VO DAACS
Mission	Source	Destination	Data Content	Test Data Source/Contact
TRMM	NOAA ADC	ECS at the LaRC DAAC	Ancillary and Correlative Data.	Currently VO DAACS
TRMM	NOAA ADC	ECS at the EDC DAAC	Ancillary and Correlative Data.	Currently VO DAACS
AM-1	SCF	EOC	Instrument software loads.	ESDIS Test Data Working Group
AM-1	SCFs	ECS at the GSFC DAAC	Algorithms.	ESDIS Test Data Working Group
AM-1	SCFs	ECS at the LaRC DAAC	Algorithms.	ESDIS Test Data Working Group

Table 4-3. Release A Data Sources, Destination, and Data Content (2 of 2)

Mission	Source	Destination	Data Content	Test Data Source/Contact
AM-1	SCFs	ECS at the EDC DAAC	Algorithms, LANDSAT L0R Data	ESDIS Test Data Working Group
AM-1	SCFs	ECS at the LaRC DAAC	CERES higher level products	ESDIS Test Data Working Group
TRMM	SDPF	ECS at the LaRC DAAC	CERES Level-0, Housekeeping, Expedited Telemetry and Definitive Orbit Data.	ESDIS Test Data Working Group
TRMM	TSDIS	SMC at GSFC	Schedule Coordination & Adjudication for Data Exchange with DAACs; and Status Information	Internally Generated
TRMM	TSDIS	ECS at the GSFC DAAC	PR and TMI Level-1A through Level-3 Data Products; GV Data; Request For Ancillary/Correlative Data; and TRMM Product Delivery Schedules.	ESDIS via TRMM Project
TRMM	TSDIS	ECS at the GSFC DAAC	VIRS Level-1A through Level-3 Data Products; Request For Ancillary/Correlative Data; and TRMM Product Delivery Schedules.	ESDIS via TRMM Project
All Missions	Version-0 DAACs	ECS at the GSFC DAAC	Inter DAAC and Cross DAAC Communications; Inter-Operability; and Data Transfer.	VO DAACS
All Missions	Version-0 DAACs	ECS at the LaRC DAAC	Inter DAAC and Cross DAAC Communications; Inter-Operability; and Data Transfer.	VO DAACS
All Missions	Version-0 DAACs	ECS at the EDC DAAC	Inter DAAC and Cross DAAC Communications; Inter-Operability; and Data Transfer.	VO DAACS

5. Test Execution and Coordination

This section describes the process by which formal acceptance testing is managed at the site on a daily basis. The responsibilities of the test manager and test engineers are also described.

5.1 Acceptance Test Planning

Acceptance test planning is formally presented in the Verification Plan (DID 401/VE1), the Acceptance Testing Management Plan (DID 415/VE1) and the Acceptance Test Plan (DID 409/VE1). Both the ATP and ATPr documents reference the requirements verification matrix contained in the Verification Specification (DID 403/VE1). Contents of the Verification Specification are, in turn, imported from the requirements matrix data base maintained by the RTM tool. The Configuration Management activities related to transferring software code is described in the ECS Configuration Management Plan (DID 102/MG1) and the Configuration Management Procedures (DID 103/MG3).

Volumes 1-5 of the ECS System Acceptance Test Procedures provides the detailed test procedures for each site. Appendix A provides the template and data field descriptions for the test procedures format used in these sections. The sequence of activities that lead up to the completion of the Release A acceptance testing is shown in Figure 5-1. It shows the series of acceptance test activities that take place, how they relate to the major ECS reviews, and their relationship with the documents produced. It also shows the activities and their relationships with the System I&T, and Operations Phases of the Release A acceptance testing life cycle.

5.2 Acceptance Test Preparation

The initial activities of acceptance test preparation are conducted at the ECS Development Facility (EDF). First, an inventory of the resources needed to perform acceptance tests is taken. Items inventoried include test input data, automated test tools, and technical documentation. If any required items are found to be missing or insufficient for acceptance test performance, corrective action is taken. Prior to CSR, walk-throughs of the entire Acceptance Test Procedure are conducted at the EDF to ensure proper format, contents, and completeness of the test scenarios and test plan. Additionally, concurrent with the execution of I&T, critical acceptance test sequences and test cases are executed by IATO against the I&T baseline to ensure that any major problems with either the Release, or the Acceptance Test Procedures and resources, are found at the EDF. During the EDF test activities, discrepancies are documented as NCRs. NCRs written during this time frame are controlled by the Release A CCB.

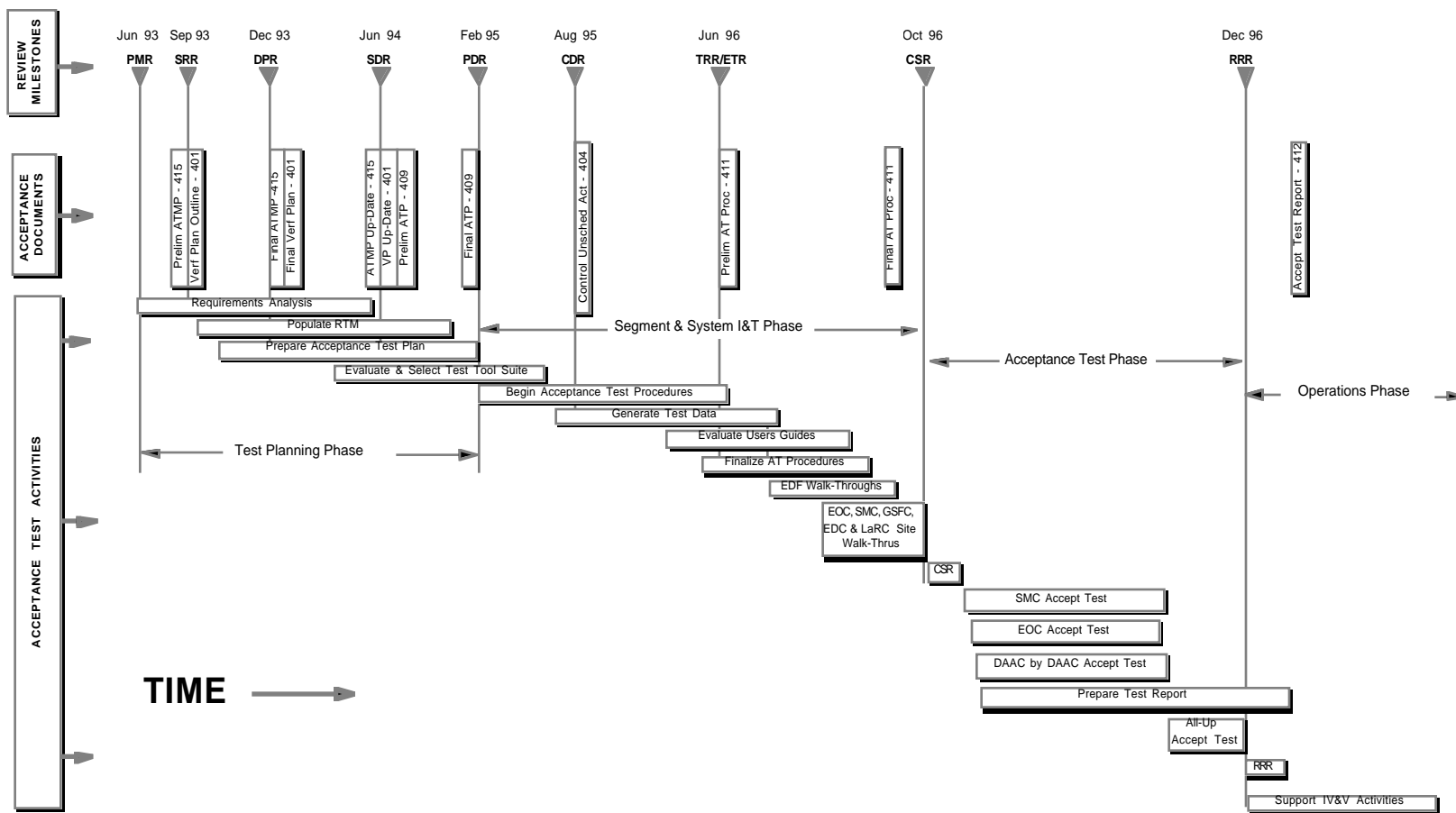


Figure 5-1. Release A Acceptance Test Life Cycle

5.2.1 Software Pre-Install

Approximately 30 days prior to CSR, an ECS software pre-installation is performed at the applicable operational sites. The software used is a snapshot to the ECS system undergoing final system integration at the EDF. The pre-install serves as a pathfinder for the install of the formal delivery occurring after CSR. The activity is led by a development organization team consisting of developers and system I&T. Support is provided by configuration management and acceptance testing personnel, assisted by the M&O personnel already on site. A critical function of the pre-install is to perform the DAAC specific configuration of the ECS, such as verifying network addressing, enabling DAAC-unique functions, and tailoring COTS configuration files.

Discrepancies observed during the software pre-install are formally filed as NCRs. Changes to site-specific configuration files formulated as a result of pre-install are forwarded to the EDF for incorporation into the formal baseline. The formal installation of the release is accomplished at the sites immediately following CSR to support acceptance test implementation.

5.2.2 Release A Acceptance Test Readiness Reviews

In conjunction with CSR, Acceptance Test Readiness Reviews (ATRRs) are conducted at the applicable operational sites by the ECS Maintenance and Operations (M&O) organization. During this time, each site's readiness to receive Release A is assessed. The ATRR assesses plans for software installation and for conducting Acceptance Tests in parallel with on-going site operations.

5.2.3 Release A Consent to Ship Review

Before the shipment of ECS Release A to the operational sites, a CSR is held to address the readiness of the release for delivery to the operational sites for testing. The purpose of the CSR is to:

- Review the results of integration and test activities
- Review the approach for installation and test of the release at the operational sites to ensure that disruptions to ongoing operational services are minimal or nonexistent
- Review the status of test procedures for operational system integration and acceptance testing
- Determine the readiness of the equipment and staff at the operational sites for release installation

The CSR includes a review of the software pre-installs at the operational sites, and the acceptance test preparation activities at the EDF. CSR review items include:

- DID 324/405-I&T Report (preliminary)
- DID 411-Acceptance Test Procedures

- DID 512-Maintainability Demonstration Test Plan
- DID 521-CSR Tabulation of Non-conformance Reports
- DID 603-Operation Readiness Plan
- DID 609-Operations' Reference Manual
- DID 611-Mission Operations Procedures
- DID 625-Training Material

Based on the CSR presentation and the delivered CDRL documents, a recommendation is made to ESDIS to accept or reject Release A. ESDIS makes the formal decision to ship or not to ship the release.

5.3 Acceptance Test Implementation

Following a successful CSR, Release A is formally installed at the applicable operational sites. The formal installation replaces the pre-installation efforts. The formal installation of Release A includes custom code and commercial-off-the-shelf (COTS) software and, as applicable, executables, load modules, test data sets, test tools, and documentation. The formal installation at the operational sites is performed by the I&T organization, supported by the CMO and the M&O organization.

Prior to the execution of test scenarios at the test sites, three final checks are performed. The first check consists of a survey of the operational sites where the release is to be tested. This pre-test site check is to provide confidence that each operational site is properly configured for formal acceptance testing. The next pre-test check consists of performing a selected set of test cases from Ir1 to ensure that existing operations at the site are not adversely affected by the installation of the new release. The final check consists of a walk-through of the entire set of acceptance test procedures to ensure site compatibility for the release. In the event that any discrepancies are observed during these three checks, the discrepancies are filed as NCRs in the NRCA system.

5.4 Test Execution and Error Handling

When the final checks have been successfully executed the actual commencement of the formal acceptance test are coordinated with the Site Manager by the Test Manager. All acceptance tests are conducted under the direction of the Test Manager who has absolute authority regarding all aspects of the execution of the acceptance test. This authority includes the assignment of priority to NCR's and their disposition and impact on ongoing testing. This authority may be delegated by the Test Manager to the Test Conductor at specific times such as absences from the sites or off shifts hours. For additional information concerning duties of other acceptance test participants, see the Verification Plan (DID 401/VE1).

At each test site, site-specific and all up test phases are executed. The site-specific test focuses on each individual site, and the all-up test phase includes all sites and elements testing simultaneously. At each site, the final scenario to be executed is an acceptance test demonstration, which exercises a

comprehensive sequence of events verifying the overall site-specific and ECS-wide capabilities of the release.

In unusual circumstances, where there is an unscheduled interruption in the execution of a planned Acceptance Test session, the Procedures For Control of Unscheduled Activities During Verification for the ECS Project (DID 404/VE2) may be invoked. This document describes the process used to resolve unplanned activities during the verification process.

5.4.1 Non-Conformance Reporting

Discrepancies observed during Acceptance Testing are filed as NCRs and entered into the NRCA system for disposition by the Release A CCB. If the CCB determines that modifications are necessary, the software is returned to the developers for correction. After the NCRs are corrected and test criteria have been met, the results are reported to the Release A CCB. The Release A CCB authorizes or rejects delivery of the software fixes to the operational sites. Figure 5-2 graphically depicts the NCR process throughout the acceptance test phase. Figure 5-3 provide sample reports available from the NRCA system.

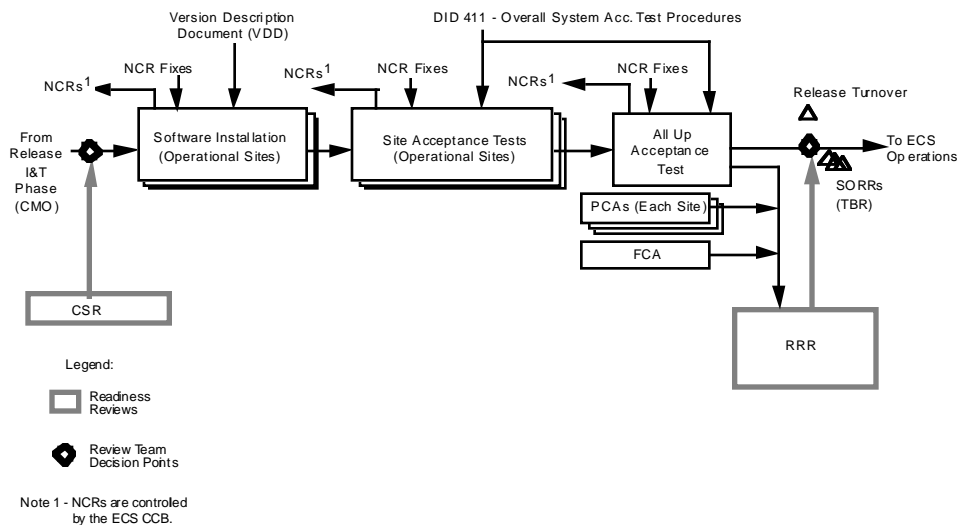


Figure 5-2. Acceptance Test NCR Process

Total Problems by Severity

Severity 1	25 (17%)
Severity 2	35 (24%)
Severity 3	48 (33%)
Severity 4	23 (16%)
Severity 5	15 (10%)
TOTAL	146

Unresolved Problems

Severity 1	0
Severity 2	0
Severity 3	0
Severity 4	0
Severity 5	0
TOTAL	0

Total Problems by State

New	0 (0%)
Assign-Eval	0 (0%)
Assign-Fix	0 (0%)
Fixed	0 (0%)
Assign-Verify	0 (0%)
Verified	0 (0%)
Closed	142 (97%)
Duplicate	4 (3%)
TOTAL	146

Figure 5-3. NRCA System Sample Reports

5.4.2 Acceptance Test Delays

As acceptance testing continues, the severity and number of unresolved NCRs are monitored on a daily basis, and compared with the established acceptance test criteria. As circumstances dictate, it may be necessary to halt testing based on the number and severity of open NCRs and resume testing when they have been corrected and incorporated in a new test version. Table 5-2 describes the discrepancy classification and priority scheme. Also, when an NCR documents an instance that impedes further testing, acceptance testing may be halted at the discretion of the Test Manager. In such cases, the release is returned to the responsible development organizations.

Table 5-1. Discrepancy Classification and Priority

Classification	Description
Severity 1	Catastrophic bug without work around that causes total failure or unrecoverable data loss.
Severity 2	Bug which severely impairs functionality. Work around might exist but is unsatisfactory.
Severity 3	Bug that causes failure of non critical system aspects. There is a reasonably satisfactory work around.
Severity 4	Bug of minor significance. Work around exists or, if not, the impairment is slight.
Severity 5	Very minor defect. Work around exists or the problem can be ignored.

CM tracks the product changes and revisions that result from correcting nonconformances. The revised version is returned to the test site. The acceptance test conductor then retests the new version using the scenarios that uncovered the original discrepancy to determine if the nonconformance was corrected. In addition, some regression testing may be conducted to make sure that the fix has not adversely affected other functions previously tested.

5.4.3 Discrepancies At Other Sites

As the acceptance testing proceeds from site to site, discrepancies may be uncovered which were not observed during tests at previous sites. If the mitigation of these discrepancies requires the generation of a new release version, retesting of the new version at each site is conducted during the all-up ECS acceptance test. Additional information on testing during verification is found in the Procedures for Control of Unscheduled Activities During Verification (DID 404-CD-001-001).

5.4.4 Physical Configuration Audits

The objective of the Physical Configuration Audits (PCAs) is to verify at each operational site that the “as-built” Release conforms to its design documentation. The PCA includes a detailed audit of engineering drawings, specifications, technical data for hardware; and a detailed audit of design documentation, listings, and manuals for software. The PCAs are conducted by an ECS Project team lead by CMO, and witnessed, at their option, by the ECS Project Quality Office (QO) and ESDIS. The results are presented at the Release Readiness Review (RRR) and documented in DID 506, Audit Reports. Approval of the Release A PCAs by ESDIS establishes the formal Product Baseline for Release A.

5.4.5 Functional Configuration Audit

The objective of the Functional Configuration Audit (FCA) is to verify that Release A’s actual performance complies with its requirements and interface specifications. FCAs for Release A are satisfied by an inspection of the Acceptance Test results and are conducted by an ECS Project team

led by CMO. The FCA activities are witnessed, at their option, by the ECS Project Quality Office (QO) and ESDIS. The results are presented at the Release Readiness Review (RRR) and documented in DID 506, Audit Reports.

5.4.6 Release Readiness Review (RRR)

After testing is complete, the IATO leads the Release Readiness Review (RRR) and reports on the results of the Release Acceptance Test to the ESDIS review team. The results presented in the RRR provides the basis by which ESDIS determines if the release is ready to proceed to IV&V operations. The ECS System Acceptance Test Report (DID 412/VE2) and the Acceptance Data Package (DID 535/PA1) are delivered to the Government four weeks after RRR to provide detailed test results, their analysis and a summary of open items to be corrected in the next version.

5.5 Test Logs

The test results are logged into the Test Conductor's site test log on a daily basis. Each entry contains the time and date, test procedure number, and results of the test procedure, including NCRs written during the tests. Figure 5-4 is an example of the test log summary used for acceptance tests. Any deviations from the test procedures is recorded in the test logs.

In addition, the actual procedures are marked up to indicate temporary (black or blue ink) and permanent (red ink) changes. Refer to the Procedures For Control of Unscheduled Activities During Verification for the ECS Project (DID 404/VE2) for the detailed process. All procedure markups, test logs, and supporting documentation are included in the formal Test Report to be delivered following RRR.

Sequence:			
Test Procedure Name:			
Test Procedure ID:			
Test Location:	Site:		
S/W Config./ Version:			
H/W Config./ Host Names:			
Test Data:			
Test Tools/ Scripts:			
Test Date:			
Witness(es):			
Comments:	Test Time:		
NCRs Written:			
NCRs Verified:			
NCRs Un-Verified:			
n Pass	Fail	Partial Pass/Fail	
1st Run	Formal Run	Retest	Release
Tester Signature(s)		Witness Signature(s):	
_____		_____	
_____		_____	
_____		_____	

Figure 5-4. Test Log Summary

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6. Release A Test Schedule

The current plans call for conducting Release A acceptance testing during the two month period following the CSR, which is scheduled to occur October 1, 1996. The plan specifies conducting acceptance tests in three sessions. The first session occurs during the first three week period following CSR at SMC, EOC, GSFC, and LaRC. The second session occurs the following two weeks at EDC, with SMC and EOC remaining involved to participate where mutual testing is required. The final session occurs during the remaining three weeks of the period. During the final three weeks an All-Up End-to-End session occurs with all five sites participating.

6.1 Test Schedule

Figure 6-1 includes the detailed activity schedule for acceptance tests. The detailed test activity schedule for individual site is included in the respective volume.

Several assumptions were made for the overall acceptance test schedule.

- 1) Each test will take approximately 3 hours to execute,
- 2) Work proceeds five days per week, 8 hours/day,
- 3) No more than 2 tests will be ongoing at any one time at each site,
- 4) No problems/failures/delays occur.

These assumptions are validated or adjusted during the various test activities describe in Figure 6-1. As schedule adjustments are made, the details are presented during technical interface and management meetings with both the ECS project personnel and the Government.

The final detailed site schedules are coordinated with each site prior to the conduct of acceptance tests and during site personnel interface meetings. The final schedule includes dates, times and duration for all formal acceptance testing that may occur at each site.

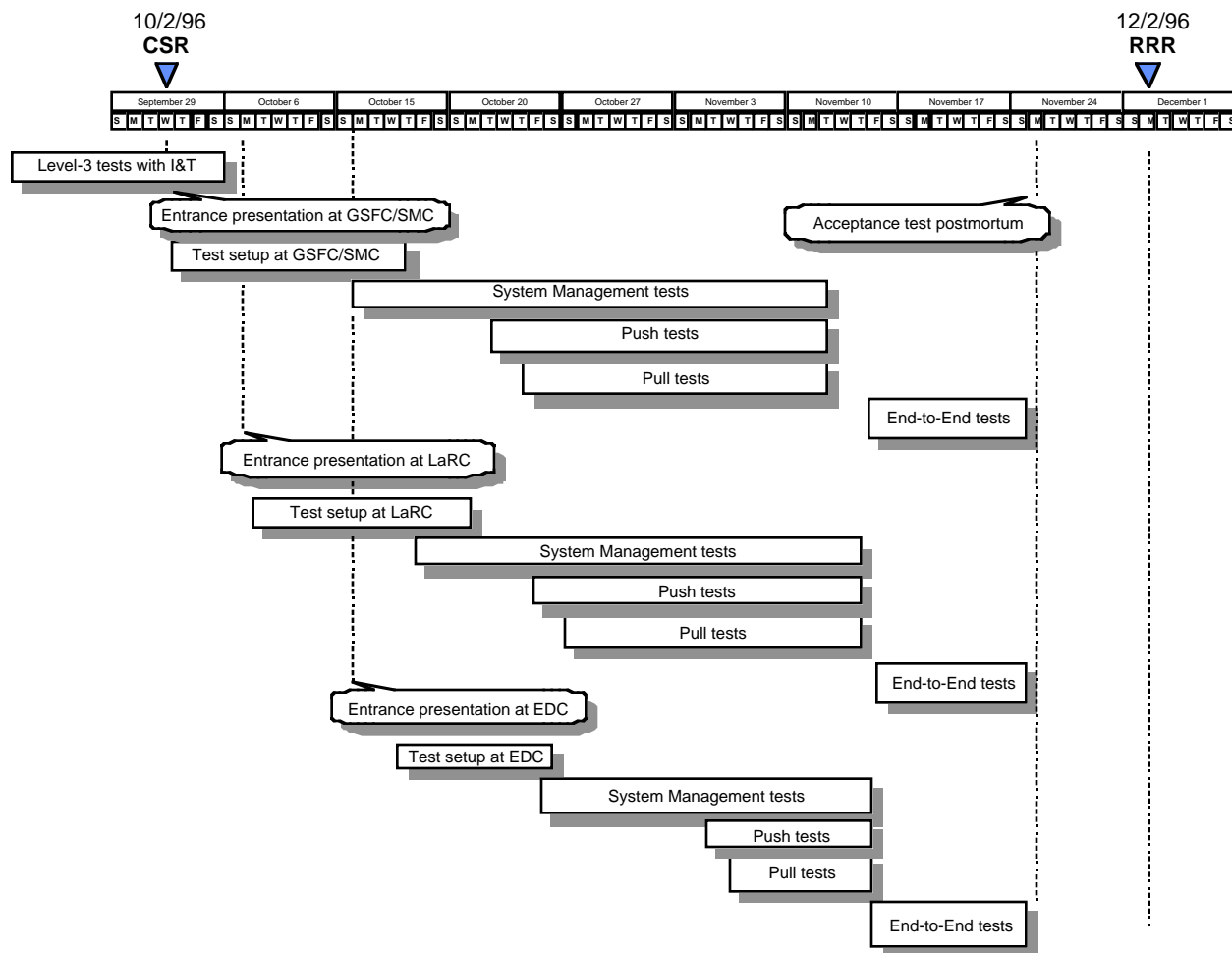


Figure 6-1. Release A Detail Test Activity Schedule

7. EOC Overview

This EOC volume contains the step-by-step procedures used in verifying Release A Flight Operations Segment (FOS) and support capabilities installed at the EOS Operations Center (EOC) and the ECS portion of Instrument Support Terminals (ISTs). Support capabilities include communications and system management services and applicable ECS system-level capabilities.

This EOC Overview section describes the functions, interfaces, facilities, configuration, required operator positions, organization, and schedule for testing the EOC for Release A.

7.1 EOC Release A Functions

The EOC performs mission planning, command, and control of U.S. EOS spacecraft and U.S. EOS instruments. The EOC also coordinates mission operations for non-U.S. instruments that fly on U.S. EOS spacecraft.

During the Release A time frame, the ECS supports EOC site activation and EOS AM-1 early interface testing and provides core FOS functionality to the EOC and ISTs. The basic elements of planning and scheduling, commanding, telemetry, analysis, data management, resource management, and user interface services are provided. The EOC accomplishes flight operations activities for the AM-1 spacecraft and its five instruments: (1) Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER), (2) Clouds and Earth's Radiant Energy System (CERES), (3) Multi-angle Imaging Spectro-Radiometer (MISR), (4) Moderate Resolution Imaging Spectroradiometer (MODIS), and (5) Measurements of Pollution in the Troposphere (MOPITT).

The ECS provides ISTs with software so that Principal Investigators/Team Leaders (PIs/TLs) and the ASTER GDS can participate in flight operations activities for their respective instruments from remote sites. ISTs have many EOC capabilities, but not commanding. For most of this document, the acronym "IST" refers to ECS capabilities installed at ISTs.

7.2 EOC Interfaces

Support to AM-1 early interface testing entails the EOC's and ISTs' abilities to exchange messages in the correct format with their Release A interfacing systems. Figure 7-1 shows the operational interconnection of the EOC and ISTs with external, i.e., non-FOS, systems in the Release A time frame. The EOC exchanges data with ISTs and with the following external systems: EOS Data and Operations System (EDOS), Network Control Center (NCC), Flight Dynamics Facility (FDF), Goddard Space Flight Center (GSFC) Distributed Active Archive Center (DAAC), and System Monitoring and Coordination Center (SMC). The ISTs interface with the ASTER GDS and SCFs. During Release A acceptance testing at the EOC, the interfaces with the GSFC DAAC and SMC are real, but the remaining external interfaces and IST hardware are simulated. A summary of the content and carriers associated with the data flowing across these interfaces is shown in Table 7-1.

7.3 EOC Facility and Test Environment

The EOC is located on the second floor of Building 32 at NASA/GSFC in Greenbelt, Maryland. Acceptance testing of FOS functionality, including ECS-provided functionality for ISTs, is conducted at the EOC.

7.3.1 EOC Facility

Figure 7-2 shows the EOC floor plan in the Release A time frame. Mission Operations, Mission Planning, Mission Analysis, Simulator and Sustaining Engineering, Launch and Test Support, and Equipment areas are shown. Telephone (T) and electrical (E) rooms are also depicted.

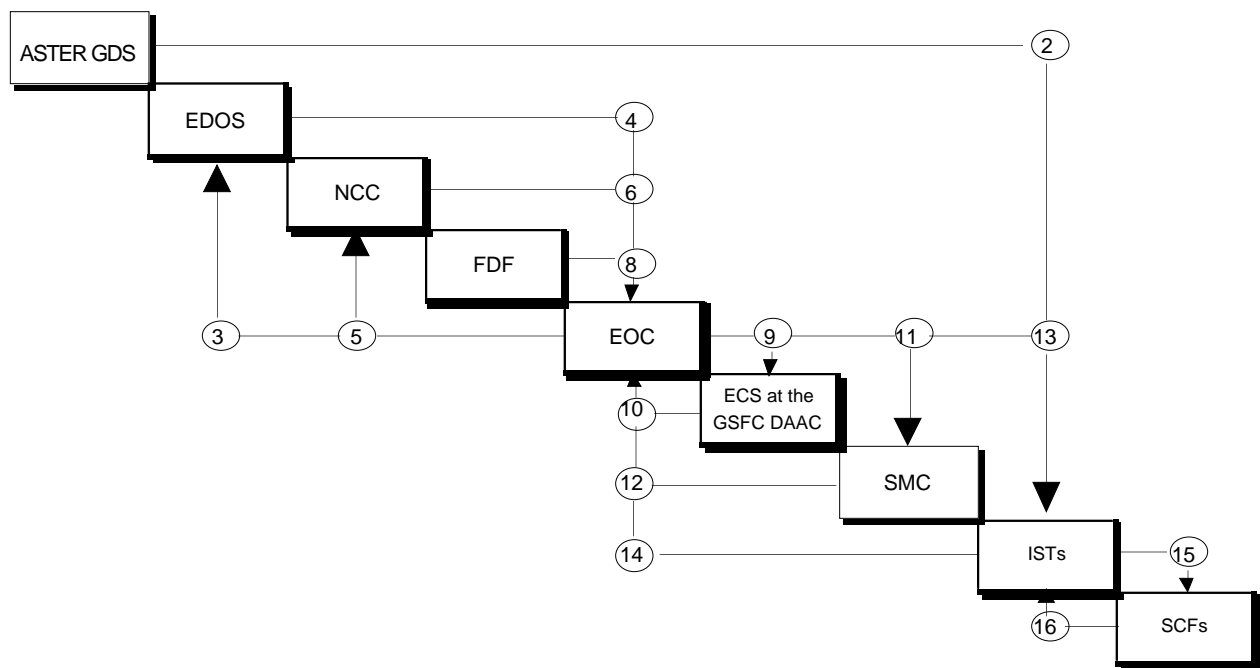


Figure 7-1. EOC/IST Release A Interface Nodes

Table 7-1. EOC and IST Release A External Interfaces

Node	Source	Destination	Carrier/Media	Data Content
2	ASTER GDS	ISTs (ASTER only)	ASTER LAN	<ul style="list-style-type: none"> • ASTER Short Term Schedule • ASTER One Day Schedule
3	EOC	EDOS	EBnet	<ul style="list-style-type: none"> • Spacecraft and instrument commands
4	EDOS	EOC	EBnet	<ul style="list-style-type: none"> • Spacecraft and instrument real-time telemetry <ul style="list-style-type: none"> - Housekeeping - Health and safety - Standby
5	EOC	NCC	EBnet	<ul style="list-style-type: none"> • Ground Control Message (GCM) Requests
6	NCC	EOC	EBnet	<ul style="list-style-type: none"> • GCM Status and Disposition messages
8	FDF	EOC	EBnet	<ul style="list-style-type: none"> • Basic connectivity test messages
9	EOC	ECS at the GSFC DAAC	Exchange LAN	<ul style="list-style-type: none"> • Spacecraft and instrument telemetry for archive
10	ECS at the GSFC DAAC	EOC	Exchange LAN	<ul style="list-style-type: none"> • Archived telemetry data
11	EOC	SMC	Exchange LAN	<ul style="list-style-type: none"> • Reports
12	SMC	EOC	Exchange LAN	<ul style="list-style-type: none"> • Directives
13	EOC	ISTs	<ul style="list-style-type: none"> • MODNET (for GSFC ISTs) • Ebnet (for ASTER IST) • NSI (for ISTs not at GSFC or ASTER) 	<ul style="list-style-type: none"> • Spacecraft and instrument real-time telemetry <ul style="list-style-type: none"> - Housekeeping - Health and safety - Standby
14	ISTs	EOC	<ul style="list-style-type: none"> • MODNET (for GSFC ISTs) • Ebnet (for ASTER IST) • NSI (for ISTs not at GSFC or ASTER) 	<ul style="list-style-type: none"> • Instrument planning and scheduling <ul style="list-style-type: none"> - Activity definitions - Baseline Activity Profiles (BAPs) - BAP modifications - ASTER Short Term Schedule (ASTER IST only) - ASTER One Day Schedule (ASTER IST only) • Instrument microprocessor memory loads
15	ISTs	SCFs	Campus Network	<ul style="list-style-type: none"> • Instrument analysis results
16	SCFs	ISTs	Campus Network	<ul style="list-style-type: none"> • Instrument microprocessor memory loads

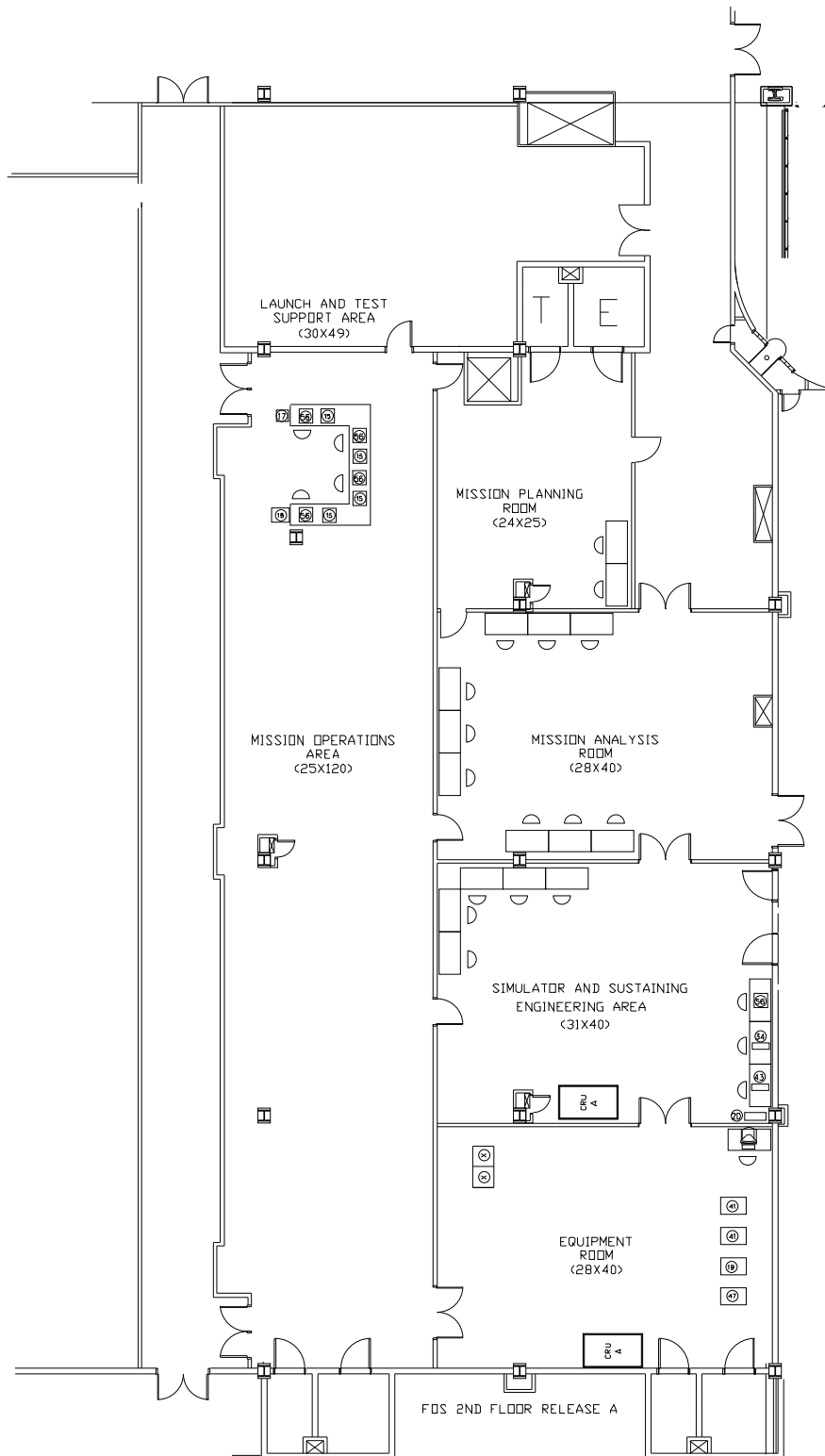


Figure 7-2. EOC Release A Floor Plan

7.3.2 EOC Acceptance Test Environment

The Acceptance Test Environment is shown schematically in Figure 7-3. Real interfacing systems that are available for EOC Release A acceptance testing include the SMC and GSFC DAAC, which are both located in Building 32 but outside the EOC. The EOSDIS Test System (ETS) Multimode Portable Simulator (MPS), which is also shown outside the EOC, can be used to generate AM-1 telemetry data and simulate the EDOS interface with the EOC. Data Drivers depicted within the EOC are used in generating and sending test data to the EOC and ISTs and in receiving EOC- and IST-generated messages. Thus these drivers represent sources of data ingested by the EOC and ISTs and sinks of messages transmitted by the EOC and ISTs. These data sources and sinks include the NCC, EDOS, ASTER GDS, and FDF.

Test personnel emulate actions performed by the Flight Operations Team (FOT) and Instrument Operations Team (IOT) Workstations through FOT, IOT, and Management Subsystem (MSS) Workstations. The FOT and MSS Workstations are used in verifying EOC capabilities and remain part of the EOC configuration after Release A acceptance testing. Emulated IOT Workstations, which are located at the ECS Development Facility (EDF) during Release A acceptance testing, are used in verifying IST capabilities provided by FOS.

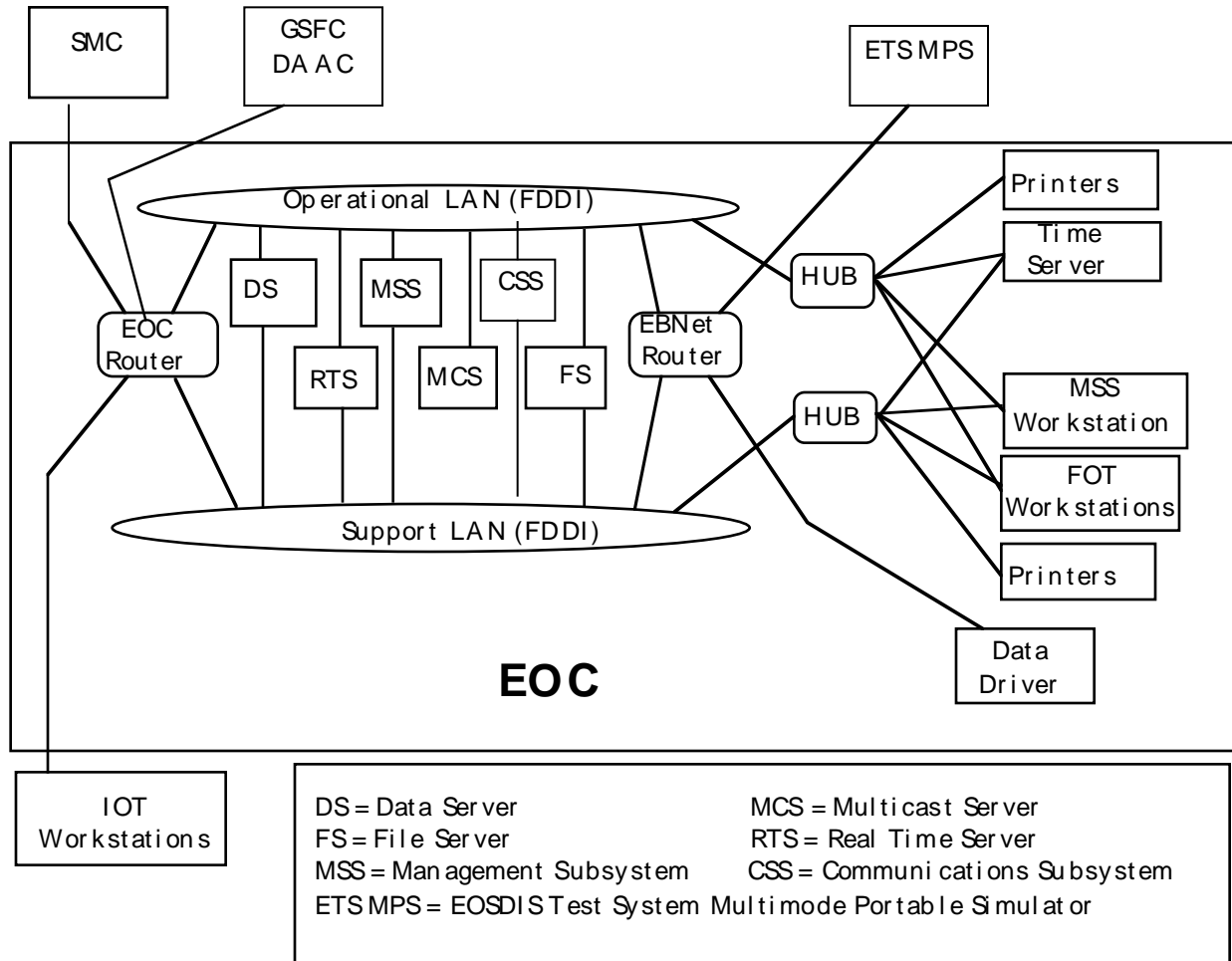


Figure 7-3. EOC Release A Acceptance Test Environment

7.3.3 EOC Test Environment Safety Considerations

The Hazard Analyses for the ECS Project (DID 513) considered both hardware and software caused hazards for each element and segment of ECS. Hazards to ECS personnel and to ECS equipment, and potential hazards external to ECS were considered. This analysis concluded that the effect of ongoing and future planning and implementation processes to purchase, verify, integrate and test, install, operate and maintain COTS hardware minimizes the potential for a ground system hazardous condition to personnel or equipment. These various processes and the documents that describe them are:

- Procurement of COTS hardware to commercial practice UL performance and safety standards. Other commercial standards such as ANSI, BICSI, CCITT, EIA, IEEE, ISO, and NEC may also be applicable. The COTS hardware installed in the user environment has been engineered for the user desktop operating environment with enclosed components and no exposure to moving parts or electrical discharge. The COTS hardware installed in

the data center environment will be accessible only to authorized, trained and certified operators and maintainers.

- Installation and Facility Planning to provide the EOC with site specific Installation Plans and the ECS Facilities Plan (DID 302) to provide the planning necessary to assure that each ECS component will meet all requirements for interfacing with the facilities in which they are located. The Facilities Plan will contain physical layout, electrical power requirements, air conditioning requirements, antenna foundation, final equipment layout, mechanical/electrical loads, and functional arrangements.
- Environmental Control Planning to identify, in the Environmental Control Plan (DID 532), suitable environmental and cleanliness controls for all areas used for the operation, storage, maintenance, repair, inspection, or test of system equipment.
- Maintenance Planning, in the COTS Maintenance Plan (DID 613), to describe policies and procedures to be applied to maintenance of all hardware and software under Maintenance and Operations (M&O) responsibility.
- M&O Procedures and the Operational Readiness Plan (DID 603) to describe the processes to assure all elements are in a state of operational readiness at all times.
- M&O Personnel Certification and Training to define the certification and COTS training required to prepare personnel to operate, maintain, and use the ECS. The COTS Training Plan (DID 622) and the M&O Certification Plan (DID 626) detail the approach and procedures required.
- Security Planning documents the approach to physical, informational and personnel security in the ECS Security Plan (DID 214).
- Disaster Recovery and Emergency Preparedness Planning is contained in the ECS Development Facility (EDF) Disaster Recovery Plan which provides for the safety and the protection of HAIS and the safeguarding of NASA computer resources and data assets. The Emergency Preparedness Plan focuses on personnel, visitors, and non-data assets.

During the pre-test meeting with GSFC management, the following safety risks are determined:

- a. Identification of hazardous situations and/or operations
- b. Precautions and safety instructions to insure the safety of all personnel
- c. Precautions and safety instructions to prevent degradation of test articles and measuring equipment
- d. Environmental and/or other conditions to be maintained within tolerances
- e. Specifications for facility, equipment maintenance, housekeeping, certification, inspection, safety and handling requirements before, during and after test activities.

The Test Conductor coordinates with GSFC and ECS management and maintenance and operations personnel, and the Quality Office representatives concerning safety issues. If an equipment, environmental, or personnel safety concerns arises, the Test Conductor immediately

takes steps to ensure the safety of the personnel and equipment, notifies GSFC management, and coordinates corrective actions.

7.4 EOC Configuration

Following a successful Test Readiness Review (TRR), Release A is installed at the EOC. This installation includes custom code and commercial-off-the-shelf (COTS) software, executables, load modules, test data sets, test tools, and documentation. The installation is performed by the FOS Integration Team, supported by the Configuration Management Office (CMO) and the M&O organizations.

The system configuration needed to perform EOC Release A acceptance testing is listed in Table 7-2. This table lists the major hardware components and the associated subsystems and COTS software needed to successfully conduct EOC acceptance testing.

Table 7-2. EOC Release A System Configuration (1 of 5)

Hardware Component	Subsystem	COTS Software
Real-Time Server	Analysis Command Data Management Real-Time Contact Management Resource Management Telemetry User Interface	DEC UNIX3.2 (8 users) DEC Network Application Support X/Motif DEC C DEC C Dev Extension DEC C++ DEC Fuse DEC Fuse C++ Support net.h++ 2.0 tools.h++ 7.1 dbtools.h++ 2.0 DCE Client 1.0.3 (a) Kerberos 5b5 Clearcase Client 2.1 Netscape Browser 2.02 Sybase SQL Server 10.02 Sybase Open Client/C 10.02 Sybase Embedded SQL/C 10.02 Sybase SA Companion 10.02 Sybase SQR Report Writer 10.02 automount the DEC RAID Npassword 1.2.4 TCP Wrappers 7.3 Tripwire 1.2

Table 7-2. EOC Release A System Configuration (2 of 5)

Hardware Component	Subsystem	COTS Software
Data Server	Command Management Data Management Planning & Scheduling User Interface	DEC UNIX3.2 (8 users) DEC Network Application Support X/Motif DEC C DEC C Dev Extension DEC C++ DEC Fuse DEC Fuse C++ Support net.h++ 2.0 tools.h++ 7.1 dbtools.h++ 2.0 DCE Client 1.0.3 (a) Kerberos 5b5 Clearcase Client 2.1 Netscape Browser 2.02 Sybase SQL Server 10.02 Sybase Open Client/C 10.02 Sybase Embedded SQL/C 10.02 Sybase SA Companion 10.02 Sybase SQR Report Writer 10.02 automount the DEC RAID Npassword 1.2.4 TCP Wrappers 7.3 Tripwire 1.2
Multicast Server	CSS	Solaris 2.4 X/Motif Clearcase Client 2.1 DCE Client 1.0.3 (a) Tivoli client Netscape Browser 2.02 Npassword 1.2.4 TCP Wrappers 7.3 Tripwire 1.2

Table 7-2. EOC Release A System Configuration (3 of 5)

Hardware Component	Subsystem	COTS Software
CSS Server	CSS	HPUX X/Motif Clearcase Client 2.1 DCE Client 1.0.3 (a) Tivoli client Netscape Browser 2.02 net.h++ 1.0.1 tools.h++ 6.1 dbtools.h++ 1.1 Npassword 1.2.4 TCP Wrappers 7.3 Tripwire 1.2
MSS Server	MSS	HPUX X/Motif Clearcase Client 2.1 DCE Server & Client 1.0.3 (a) Tivoli Server Remedy TT 2.0.2 Netscape Browser 2.02 C C++ Softbench BX Graphpak Epak net.h++ 1.0.1 tools.h++ 6.1 dbtools.h++ 1.1 Wabi/Office PNM 2.1 HPOV 4.0 Sybase SQL Server 10.02 Sybase Open Client/C 10.02 Sybase Embedded SQL/C 10.02 Sybase SA Companion 10.02 Sybase SQR Report Writer 10.02 Sybase SQR Workbench 10.02 essm Npassword 1.2.4 TCP Wrappers 7.3 Tripwire 1.2

Table 7-2. EOC Release A System Configuration (4 of 5)

Hardware Component	Subsystem	COTS Software
FOT Workstation	CSS Analysis Data Management Planning & Scheduling Resource Management Telemetry User Interface	Solaris 2.4 (1 user) X/Motif DCE Client 1.0.3 (a) RogueWave 6.1 libraries RogueWave 7.1 libraries Kerberos 5b5 Sybase Client 10.02 Netscape Browser 2.02 automount the DEC RAID Npassword 1.2.4 TCP Wrappers 7.3 Tripwire 1.2
IOT Workstation	CSS Analysis Data Management Planning & Scheduling Resource Management Telemetry User Interface	Solaris 2.4 (1 user) X/Motif DCE Client 1.0.3 (a) RogueWave 6.1 libraries RogueWave 7.1 libraries Kerberos 5b5 Sybase Client 10.02 Netscape Browser 2.02 automount the DEC RAID Npassword 1.2.4 TCP Wrappers 7.3 Tripwire 1.2
MSS Workstation	MSS CSS	Solaris 2.4 X/Motif Clearcase Client 2.1 DCE Client 1.0.3 (a) Tivoli client Netscape Browser 2.02 DDTS 3.1.12 XRP II v3.0 Crack 4.1 Satan 1.1.1 Npassword 1.2.4 TCP Wrappers 7.3 Tripwire 1.2

Table 7-2. EOC Release A System Configuration (5 of 5)

Hardware Component	Subsystem	COTS Software
FDDI Switch Power Hub FDDI Concentrators Bay Networks FDDI Cables Ethernet Hub Cabletron Micro Ethernet Cables LAN Analyzer Communications Cabinets	ISS	There is no dedicated COTS software for the ISS.

7.4.1 EOC Hardware Configuration

The EOC hardware configuration for Release A is designed to support EOC site activation and AM-1 early interface testing and provide core FOS functionality. Table 7-3 shows the characteristics of EOC servers in the Release A time frame.

Table 7-3. EOC Release A Server Characteristics

Server	Model Number	Release A Quantity	Characteristics
Real-Time Server FOS-EOC-6	DEC 1000 4/266	1	256 MB Memory 8 GB Local Drive (internal) FDDI Attached POSIX IEEE 1003.1 POSIX IEEE 1003.4 CD-ROM (internal) 4 MM DAT Drive (internal)
Data Server FOS-EOC-7	DEC 1000 4/266	1	256 MB Memory 8 GB Local Drive (internal) FDDI Attached POSIX IEEE 1003.1 POSIX IEEE 1003.4 CD-ROM (internal) 4 MM DAT Drive (internal)
Multicast Server MSS-EOC-4	SUN Sparc 20/71	1	128 MB Memory 4 GB Local Drive FDDI Attached POSIX IEEE 1003.1
CSS Server CSS-EOC-1	HP J210/1	1	256 MB Memory 2 GB Local Drive (internal) 20 GB External Drive (RAID MSS-EOC-3A) Shared with MSS Server (MSS-EOC-3) FDDI Attached POSIX IEEE 1003.1 CD-ROM
MSS Server MSS-EOC-3	HP J210/1	1	256 MB Memory 2 GB Local Drive (internal) 20 GB External Drive (RAID MSS-EOC-3A) Shared with CSS Server (CSS-EOC-1) FDDI Attached POSIX IEEE 1003.1 CD-ROM
File Server FOS-EOC-2	DEC 1000 4/266	1	128 MB Memory 4 GB Local Drive (internal) 20 GB External Drive (RAID FOS-EOC-2A) FDDI Attached POSIX IEEE 1003.1 CD-ROM 4 MM DAT Drive

7.4.2 EOC Software Configuration

The EOC software configuration is contained within 12 subsystems. There are nine FOS and three Communications and System Management Segment (CSMS) subsystems.

The following is a brief overview of the FOS software subsystems. A more comprehensive description can be found in the Flight Operations Segment (FOS) Design Specification for the ECS Project (Segment Level Design) (DID 305) and the individual Design Specifications for the FOS subsystems (DID 305).

- **Planning and Scheduling:** The Planning and Scheduling Subsystem integrates plans and schedules for spacecraft, instruments, and ground operations. The Planning and Scheduling Subsystem provides the operational staff with a common set of capabilities, including generating and visualizing plans and schedules.

The IOTs actively participate in the EOS mission planning process through the planning and scheduling tools in the IST toolkit. Included in the toolkit is global visibility into the mission timeline and the set of scheduling products generated at the EOC.

- **Command Management:** The Command Management Subsystem manages the pre-planned command data for the spacecraft and instruments. Based on inputs received from the Planning and Scheduling Subsystem, the Command Management Subsystem collects and validates the commands, software memory loads, tables loads, and instrument memory loads necessary to implement the instrument and spacecraft scheduled activities.
- **Command:** The Command Subsystem is responsible for transmitting command data (i.e., real-time commands or command loads) to EDOS for uplink to the spacecraft during each real-time contact. Command data can be received in real-time by the operational staff or as preplanned command groups generated by the Command Management Subsystem. The Command Subsystem is also responsible for verifying command execution on-board the spacecraft.
- **Telemetry:** The Telemetry Subsystem receives and processes housekeeping telemetry (in CCSDS packets) from EDOS. After packet decommutation, the telemetry data is converted to engineering units and checked against boundary limits.
- **Analysis:** The Analysis Subsystem is responsible for managing the on-board systems and for the overall mission monitoring. Its functions include performance analysis and trend analysis. It also cooperates with the Telemetry Subsystem to support fault detection and isolation.
- **Resource Management:** The Resource Management Subsystem provides the capability to manage and monitor the configuration of the EOC. This includes configuring the EOC resources for multi-mission support and facilitating operational failure recovery during real-time contacts.
- **Real-Time Contact Management:** The Real-Time Contact Management Subsystem is responsible for managing the real-time interface with the NCC and EDOS, as well as with the DSN, as applicable.

- **Data Management:** The Data Management Subsystem is responsible for managing EOC data. This includes maintaining and updating the Project Data Base (PDB), Metadata, and Operational Data Files (ODF).
- **User Interface:** The User Interface Subsystem provides character-based and graphical display interfaces for FOS operators interacting with all of the aforementioned FOS subsystems.

The following is a brief overview of the CSMS software subsystems. A more comprehensive description can be found in the individual Design Specifications for the CSMS subsystems (DID 305).

- **Management Subsystem (MSS):** The Management Subsystem (MSS) provides enterprise management (network and system management) for all ECS resources: commercial hardware (including computers, peripherals, and network routing devices), commercial software, and custom applications. Additionally MSS also supports many requirements allocated to FOS for management data collection and analysis/distribution.

The MSS allocates services to both the system-wide and local levels. With few exceptions, the management services will be fully decentralized, no single point of failure exists which would preclude user access. In principle every service is distributed unless there is an overriding reason for it to be centralized. MSS has two key specializations: Enterprise Monitor and Coordination Services and Local System Management Services.

- **Communications Subsystem (CSS):** The CSS services include peer-to-peer, advanced distributed, messaging, management, and event-handling communications facilities. These services typically appear on communicating end-systems across an inter-network and are not layered, but hierarchical in nature. Additionally, services to support communicating entities are provided, including directory, security, time, and other ancillary services. The services of the Communications Subsystem are functionally dependent on the services of the Internetworking Subsystem. The services of the common facility, object and Distributed Object Framework (DOF) are the fundamental set of interfaces for all CSMS management and FOS user access domain services. The DOF services are the fundamental set of dependencies of the common facility and object services.
- **Internetworking Subsystem (ISS):** The Internetworking Subsystem provides for the transfer of data transparently between end systems within local and wide area networks. The ESN LANs are responsible for transfer of data within ECS sites, including the EOC. EOC interfaces with non-ECS external systems, are provided by the EOSDIS Backbone Network (EBnet). Other networks, such as NSI, provide wide-area services including connectivity between the EOC and most ISTs. In addition, "Campus" networks, which form the existing networking infrastructure at EOSDIS locations, provide connectivity between the EOC, GSFC DAAC, and SMC and also between ISTs and their respective SCFs.

7.5 ECS Consolidation for EOC Testing

The ECS test program has been consolidated for Release A testing at the EOC. As a result, acceptance test activities with respect to the EOC have been integrated at the system and segment levels. Members of the ECS System Management Office Acceptance Test Organization (ATO) and the FOS Integration and Test (I&T) organization share responsibilities for preparing, conducting, and reporting on EOC acceptance test procedures.

FOS-specific acceptance test cases contained in the ECS Overall System Acceptance Test Plan for Release A (DID 409) have been revised, consolidated, and incorporated as test procedures in the Release A Flight Operations Segment (FOS) Integration & Test Procedures for the ECS Project (DID 322). (FOS-specific procedures are not included in this Acceptance Test Procedures document.) The consolidation of ATO and FOS I&T procedures provides an integrated set of FOS-specific acceptance test procedures for the EOC.

EOC system management and communications test cases that are contained in the Acceptance Test Plan document, but not in the FOS I&T Procedures document, are expanded into test procedures in this Acceptance Test Procedures document. They verify ECS system-wide (rather than FOS-specific) functionality and EOC interfaces that are not included in the FOS I&T Procedures document.

The ATO and FOS I&T organization jointly conduct dry run and formal acceptance testing at the EOC, participate in test status meetings, prepare nonconformance reports (NCRs), and analyze test results.

7.6 EOC Test Preparation

The ATO and FOS I&T organization accomplish many activities in preparation for acceptance testing at the EOC. These activities include developing test procedures, preparing test schedules, coordinating EOC configuration and equipment for testing, learning test-related tools, and keeping the Government, Quality Office, and ECS management informed of status, schedules, and problems for the duration of these activities. In particular, the

7.6.1 Test Procedure Responsibilities

Preparing for EOC testing is a combined effort of the ATO and FOS I&T organization. Primary responsibility depends on each activity, however. The ATO is the lead organization for preparing all of this EOC Acceptance Test Procedures document as well as those test procedures derived from the Acceptance Test Plan document and incorporated into the FOS I&T Procedures document. The ATO is also responsible for executing, documenting discrepancies, and analyzing results of the applicable test procedures contained in these documents. The FOS I&T organization has the lead role in preparing the overall FOS I&T Procedures document and the thread-level test procedures contained therein. They also have primary responsibility for executing, documenting discrepancies, and analyzing results of the those test procedures.

7.6.2 Operator Positions

FOT and IOT operator positions are identified in EOC test procedures to provide a more operational approach to verification, and to confirm operator interfaces with the ECS. IOT personnel are not available to support Release A testing, and FOT personnel might also not be available. For Release A testing, ATO and FOS I&T personnel fill the FOT and IOT operator positions, as needed.

7.6.2.1 FOT Positions

The EOC is operated by the FOT, which is responsible for database maintenance, overall scheduling, spacecraft and instrument health and safety monitoring, spacecraft performance monitoring, spacecraft engineering analysis, high-level monitoring of the instrument performance, and providing periodic reports to document the operations of the spacecraft and instruments. The following FOT positions support acceptance testing.

FOT Planner/Scheduler -- Performs spacecraft and instrument command loading and schedule generation. This includes receiving planning and scheduling requests, instrument microprocessor memory loads, and command activity definitions from the Instrument Operations Teams (IOTs).

FOT Spacecraft Activity Controller -- Responsible for EOC ground system elements, hardware, software, communications links, command capability, and Local Site Manager (LSM) functions. This includes controlling and verifying ground script execution, verifying commands and load contents, transmitting and verifying commands and load uplinks, and monitoring ground system performance.

FOT Spacecraft Evaluator -- Monitors spacecraft subsystems during real-time operations and assists in spacecraft trend analysis and anomaly recognition and resolution. This includes reviewing spacecraft activity logs and monitoring ground script execution, spacecraft command activity, and spacecraft health and safety.

FOT Instrument Evaluator -- Monitors and analyzes instruments during real-time operations and assists in instrument trend analysis and anomaly recognition and resolution. This includes reviewing activity logs and monitoring ground script execution, instrument command activity, and instrument health and safety.

FOT Database Manager -- Responsible for database administration of the project database and operational data files (ODFs), maintaining data base access, validating user access/privileges, and investigating/documenting violations.

7.6.2.2 IOT Positions

Instrument operations for the AM-1 CERES, MISR, MODIS, MOPITT and ASTER instruments are distributed through the use of ISTs operated by IOTs. The following IOT positions support acceptance testing:

IOT Planner/Scheduler -- Provides the FOT with planning and scheduling requests, instrument microprocessor memory loads, and command activity definitions.

IOT Instrument Evaluator -- Performs real-time instrument command and telemetry monitoring and analysis. Responsible for instrument anomaly detection and contingency procedure execution, instrument command load validation, and instrument performance and trend analysis.

7.6.3 Pre-Test Activities

As the test procedures approach completion, the EOC equipment and network configuration needed for testing becomes firm. The ATO and FOS I&T organizations present their needs to ECS CM and integration personnel and the appropriate government offices, as necessary, to request the required equipment. Test team members continue learning the about the tools that are used in EOC verification. The test organizations participate in meetings with the Government to discuss the status, plans, schedules, site configuration, and resource requirements for testing at the EOC.

7.7 EOC Test Conduct

Test conduct is the execution of the approved test procedures in the officially approved and controlled test configuration. This key activity follows closely the configuration, inputs, steps, and test analysis activities specified for each procedure in the FOS I&T Procedures and EOC Acceptance Test Procedures documents. As tests are executed, the procedures are revised, as necessary, to reflect the as-tested inputs, configuration, steps, and test analysis information. Nonconformances are documented, test output captured and results analyzed. The Government, Quality Office, and ECS management are kept informed of status, schedules, and problems for the duration of these activities.

7.7.1 Test Direction

All formal tests are conducted under the direction of the Test Conductor who has direct authority regarding all aspects of the execution of that test. This authority includes the assignment of priority to NCRs, NCR disposition, and the NCR's impact on ongoing testing. The step-by-step details of non-conformance reporting and software configuration management is described in the Software Nonconformance Reporting and Corrective Action System Process Project Instruction (SD-1-014) and the Software Development Handbook Project Instruction (CM-1-025).

7.7.2 Test Schedule Management

The Test Conductor is responsible for the scheduling and dispatch of test resources and activities. In consultation with concerned parties, he/she determines what portion of the test will be executed on a given day. During this process all pertinent factors are examined: availability of system resources, conflicts with other activities and inherent test sequencing concerns. It is crucial that the Test Conductor be cognizant of dependencies within the test structure (e.g., does the current procedure require that another procedure has run successfully to establish initial data conditions?).

These are documented in the test procedure itself, but the Test Conductor must have broader understanding and control of the test environment at all times to deal effectively with test scheduling issues.

When a given test procedure is scheduled for execution, the Test Conductor ensures that all necessary materials and supporting data are present. Included and key to this activity are copies of the applicable test procedures, which are distributed to each participant actually performing the test. Test witnesses also receive copies so they may follow the execution. The hard copy test procedures become part of the official record of the test.

Before the beginning of a scheduled test period a pre-test meeting will be held by the Test Conductor. The Test Conductor will determine the need for both regularly scheduled and Ad Hoc meetings. The purpose of the pre-test meetings will be to:

- a. Brief the activities to be performed
- b. Assess readiness to proceed with those activities
- c. Discuss any special conditions for the conduct of the activity
- d. Apply any last minute markups to the test procedures to be used. If there are any, they will be made, initialed and dated.

All changes to test procedures, either during planning, execution, or post test analysis, must be approved by the Test Conductor. Changes to test procedures will be either temporary or permanent. Temporary changes are those that are made to accommodate a singular event or circumstance. Temporary changes generally apply to only one execution of the test procedure and are made to document the deviation for reporting purposes. Permanent changes are made to correct errors in the procedures or insert new steps which are executed every time the test is re-run. Permanent changes are reflected in the next document release which contains that particular test procedure.

7.7.3 Test Execution

The test begins under the control of the Test Conductor or a designated authority. Team participants follow, exactly, the instructions written in the procedures. In some cases, the procedures have an inherent timeline that is critical to the success of the activity. In these cases, the procedures have, for each step or group of steps, a time tag indicating when the steps should be performed. The Test Conductor coordinates the pacing of these steps by providing synchronized time sources to all participants. In other cases, the procedures have self-contained pacing instructions. These may instruct the test participant to wait until directed to proceed with a given activity.

7.7.4 Unscheduled Events During Test Execution

If problems are encountered which interrupt or prevent the execution of the test procedures, the Test Conductor must . In this context problems might include the following:

- a. Failure of the system to perform as specified in the procedure.

- b. Inability to perform the next step due to, for instance, missing data.
- c. Critical software failure.
- d. Hardware, communications, or special test equipment failure.
- e. An error in following the procedure. Steps might be inadvertently skipped. This may be noticed by a person involved in the test or might cause a more overt problem already listed above.
- f. Unexpected actions by others that affect the test environment.

It is the responsibility of the test participants to determine if problems have occurred. If there is doubt, they will immediately address their concerns to the Test Conductor. The Test Conductor is, likewise, responsible to carefully follow the conduct of the test constantly, looking for deviations or anomalies. Actions to be taken in response to unscheduled events are detailed in the Procedure for Control of Unscheduled Activities During Verification for the ECS Project (DID 404).

7.7.5 Test Conduct Documentation

Key information about test procedure execution is recorded in test logs. For each procedure executed, the test log contains information about the date/time executed, names of test personnel and witnesses, applicable NCRs, and significant comments.

Upon completion of a session of testing, all necessary information is secured. Material to be collected/controlled includes:

- a. All test procedures (including markups)
- b. Test logs
- c. Materials produced by the system under test (e.g. printouts, screen dumps)
- d. Post test file dumps. This may involve collection of actual media to perform the saves. If instead, the dumps are recorded on disk, they should be placed under CM control by saving them within the ClearCase tool. In this case, a record of the data set names and version must be maintained.
- e. NCRs written during the testing period. Note: Some problems encountered are obvious NCRs and can be written immediately. Other problems are discussed at the post test review meeting described below. ECS policy is to write NCRs freely and dispose of duplicates or erroneous submissions after review.

7.7.6 Daily Test Reviews

At the completion of each day of testing, a post test review is held to review the events of the day and overall testing status is assessed. Test logs are reviewed to determine problems encountered during the day. Each problem is assessed and a determination of the need to create an NCR is made. If an NCR is opened, a team member is assigned to enter it in the Nonconformance Reporting and Corrective Action (NRCA) system. The status and priority of the problem are

determined, if possible. Any necessary follow-up investigation is assigned including imposition of a due date. Statistics are kept citing the number of test procedures executed, number of NCRs filed, their classification, and other test metrics for status reporting purposes. Specific metrics relating to test execution will be developed, reviewed, and approved prior to the start of test execution activities.

Finally, a determination of success for the day's activities is made and discussed. This guides the planning for the next session's activities. Based on this assessment, any changes in the scheduled activities for the next day is evaluated and the test schedules and procedures updated appropriately. Generally, complete success in meeting the objectives for a day's testing result in the uninterrupted continuation of the planned test activities. Unexpected interruptions to testing result in the rescheduling of test activities and resources to minimize the impact to the testing effort.

7.8 EOC Test Schedule

EOC Release A testing involves both a dry run period and a formal period as depicted in Figure 7-4. FOS-specific tests are conducted during most of the dry run and formal testing phases. System-wide tests are conducted during the latter part of both these phases. Together, these two phases span the period between TRR and Release Readiness Review (RRR). The schedule contains some “float” at the end of each phase. Dry run testing begins shortly after TRR and ends by the Consent-to-Ship Review (CSR). This testing is performed primarily at the EOC facility following successful migration of software from the EDF to the EOC. If necessary, some early dry run testing might be accomplished at the EDF if the proper EOC configuration is not ready. Dry run testing allows the ATO and FOS I&T organizations to verify the Release A functionality prior to CSR, document software and system discrepancies, correct test procedures, and become familiar with the EOC facility and equipment prior to CSR and formal acceptance testing. Discrepancies noted during dry run testing are quickly documented and delivered to the development organization. Fixes developed and installed soon enough undergo reverification prior to CSR, if possible. At CSR, the ATO and FOS I&T organizations present the status of EOC dry run testing and plans for formal testing at the EOC.

Formal testing is scheduled to begin just after a successful CSR and continue until RRR, if necessary. Formal acceptance testing includes test witnessing and monitoring by Government representatives and the ECS Quality Office. Of course, Government representatives and the Quality Office are encouraged to witness dry run testing as well.

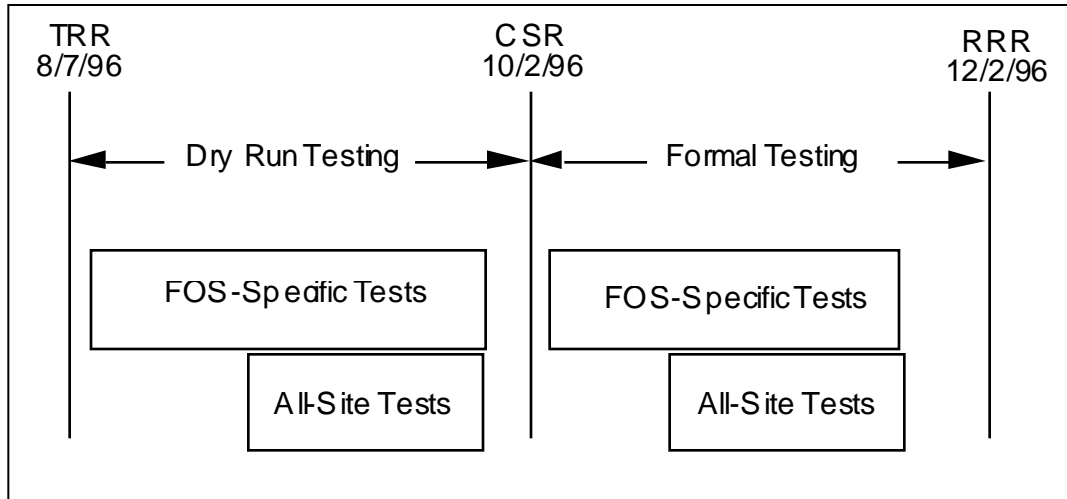


Figure 7-4. EOC Release A Test Schedule

7.9 Release Readiness Review (RRR)

Before ECS Release A is formally approved for use, an RRR is held to validate the utility and suitability of the release. This review focuses on the degree to which requirements for Release A have been satisfied. The current status of interfacing elements and the user support infrastructure within the ECS is reviewed to ensure that Release A actually improves overall system operation. Results of acceptance testing are included in the ECS Overall System Acceptance Test Report for Release A (DID 412). The Acceptance Data Package for Release A (DID 535), which is delivered several weeks after RRR, contains EOC testing logs, configuration information, and a list of open items.

The results of the Physical Configuration Audits (PCAs), conducted at each applicable operational site, are presented at RRR. Witnessed by the Quality Office and ESDIS, the PCAs are conducted by the ECS Project Team and led by the CMO. The results of the Functional Configuration Audits (FCAs), accomplished by review of Acceptance Test results, are presented at RRR. The FCA's are performed by the Quality Office and ESDIS. Both PCA and FCA results are documented and delivered in the Audit Report (DID 506).

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8. System Management Scenario Group

The objective of the System Management Scenario Group is to demonstrate the ability of ECS system facilities and infrastructure to perform ongoing operations at the levels required for Release A. The successfully completed scenarios provide assurance that this site is capable of conducting nominal and contingency maintenance and operations.

The EOC is examined to provide assurance to the AT team of its readiness to support further acceptance testing, based on its performance under the scrutiny of the ECS Site Commission Scenario. The EOC interfaces with the SMC, which conducts enterprise monitoring and coordination of operations for ECS managed resources. The EOC and SMC use these interfaces to perform configuration management, and security and accountability. The site-level configuration management and security capabilities are evaluated for functional completeness and for acceptable operation at the EOC.

8.1 ECS Site Commission Scenario

This scenario familiarizes the M&O team with the site's by acquainting the staff with site procedures and the operation and care of the site's ECS equipment. It introduces the staff to the ECS documented procedures, a demonstration of how each ECS site is "powered up", how various start-up and shut-down procedures are done, and how recovery from an abnormal shutdown is accomplished. It also demonstrates the types and availability of ECS maintenance tools and the application of approved procedures for their use. Assessment of the ECS facility Interface capability includes evaluation of both external and internal Interfaces.

Through demonstration of simulated events and through policy and procedures review, confidence is built in each site's ability to successfully respond to scheduled and unscheduled events. As a final step, the AT team estimates the site's readiness to support further acceptance testing, based on the site's performance during this condensed, comprehensive overview of the systems operation.

8.1.1 M&O Procedures Review and Confidence Test Sequence

This sequence confirms the existence and completeness of documented M&O policies and procedures and confirms the correct hardware and software configuration items of the ECS site.

Configuration: The system configuration needed to perform this sequence of tests are as follows: Real-Time Server, Data Server, Multicast Server, CSS Server, MSS Server, FOT Workstation, IOT Workstation, MSS Workstation, and ISS equipment. Refer to Table 7-2 and Table 7-3 for additional detail.

External Interfaces: There are no external Interfaces needed for this sequence.

Operator Positions: There are no operator positions needed for this sequence.

Operational Scenario: There are no operations scenarios, taken from the Operations Scenarios for the ECS Project: Release-A (605/OP1), used during this sequence of tests.

Test Dependencies: There are no test dependencies for this sequence.

8.1.1.1 ECS Sites Nominal Operations Policy and Procedures Review

TEST Procedure No. A080110.010\$F	Date Executed:	Test Conductor:
Title: ECS Sites Nominal Operations Policy and Procedures Review		
Objective: This test verifies the existence, accessibility and usability of documented operational and maintenance policies and procedures.		
Requirements	Acceptance Criteria	
SMC-2605#A	<p>This requirement is verified by analysis.</p> <p>The LSM shall support the site and element in implementing ESDIS Project policies and procedures received from the SMC covering the following areas, at a minimum:</p> <ul style="list-style-type: none">a. Element responsibility and authorityb. Resource managementc. Fault recoveryd. Testinge. Simulationf. Maintenanceg. Logisticsh. Performance evaluationi. Trainingj. Quality and product assurancek. Inventory managementl. System enhancementsm. Finance managementn. Administrative actionso. Security <p>The documented LSM MSS policies and procedures for the EOC must be available for use at the site.</p> <p>This test procedure does not verify parts e, h, j, and m.</p>	
Test Inputs: <u>Release A Version Description Document (DID 814)</u> <u>EOC Maintenance and Operations Procedures for Release A (DID 609)</u>		

Step-By-Step Procedures		
Step No.	Input Action / Expected Results	Pass / Fail / Comments
10	Tester: Confirms that configuration management has verified the <u>Release A Version Description Document</u> (DID 814) includes the following document: <u>EOC Maintenance and Operations Procedures for Release A</u> (DID 609)	
20	Expected Result: <u>EOC Maintenance and Operations Procedures for Release A</u> (DID 609) is included in <u>Release A Version Description Document</u> (DID 814).	
30	Tester: Inspects DID 609 to verify that the following items are addressed: a. Site or element responsibility and authority b. Resource management c. Fault recovery d. Testing f. Maintenance g. Logistics i. Training k. Inventory management l. System enhancements n. Administrative actions o. Security	
40	Expected Result: The following items are addressed in DID 609: a. Site or element responsibility and authority b. Resource management c. Fault recovery d. Testing f. Maintenance g. Logistics i. Training k. Inventory management l. System enhancements n. Administrative actions o. Security	
Data Reduction and Analysis Steps: The document DID 609 is inspected and ESDIS policies and procedures are verified.		
Signature:		Date:

8.1.1.2 ECS Hardware and Software Configuration Items Review

TEST Procedure No.: A080110.020\$F	Date Executed:	Test Conductor:
Title: ECS Hardware and Software Configuration Items Review		
Objective: This test verifies the ECS hardware and software configuration items are present on the system.		
Requirements	Acceptance Criteria	
SMC-2515#A	This requirement is verified through test. The LSM shall provide configuration management for at least the operational hardware, system software, and scientific software within its element and for the migration of enhancements into the operational system. The Tester verifies that the Baseline Manager contains a version history of configuration controlled resources according to each site's operational baseline as described in the <u>Release A Version Description Document</u> (DID 814). Configuration management for scientific software is not verified in this test procedure.	
Test Inputs: <u>Release A Version Description Document</u> (DID 814)		

Step-By-Step Procedures		
Step No.	Input Action / Expected Results	Pass / Fail / Comments
10	Tester: Check with configuration management personnel responsible for the EOC that the <u>Release A Version Description Document</u> (DID 814) lists all hardware and software configuration items configured into the system.	
20	Expected Results: Configuration management personnel certify that the <u>Release A Version Description Document</u> (DID 814) contains all the hardware and software configuration items present and properly configured into the EOC system.	
30	Tester: Log into the MSS Local Management Server and execute the Baseline Manager application.	
40	Expected Results: Baseline Manager application displays on the screen.	
50	Tester: Using the list of hardware and software configuration items listed in the <u>Release A Version Description Document</u> (DID 814), access and view each configuration item stored within the Baseline Manager	
60	Expected Results: Each of the configuration items listed in the <u>Release A Version Description Document</u> (DID 814) contains the current version; the current version's specifications and technical, operations, and maintenance documentation; the specification and technical documentation history; the "level of assembly" representation of the components; and the version history.	
70	Tester: Exit the Baseline Manager.	
80	Expected Results: The screen returns to the UNIX prompt.	
Data Reduction and Analysis Steps:		
Signature:		Date:

8.1.2 Site Start-up Sequence

This sequence verifies the ECS can be powered up using normal cold-start procedures, operated successfully for fifteen minutes (or less if approved by the AT test conductor) and shutdown using normal shutdown procedures. The EOC is subsequently restarted to verify the system's ability to perform normal "warm restart" procedures.

During the fifteen minutes of operational time, specific configuration changes are input to the system. After normal shutdown and restart, the observed system configuration is compared to the configuration prior to shutdown to verify the preservation of system configuration parameters.

Configuration: The system configuration needed to perform this sequence of tests are as follows: Real-Time Server, Data Server, Multicast Server, CSS Server, MSS Server, FOT Workstation, IOT Workstation, MSS Workstation, and ISS equipment. Refer to Table 7-2 and Table 7-3 for additional detail.

External Interfaces: There are no external interfaces needed for this sequence.

Operator Position(s): The operator position from the ECS Maintenance and Operations Position Descriptions document (607/OP2) needed to support this sequence is listed:

DAAC System Administrator

Operational Scenario(s): The operations scenario, taken from the Operations Scenarios for the ECS Project: Release-A document (605/OP1), that was used to develop tests in this sequence of tests are listed:

ECS System Shutdown/Startup Scenario (Section 3.1.1)

Test Dependencies: There are no test dependencies needed for this sequence of tests.

8.1.2.1 Site Startup Confidence

TEST Procedure No.: A080110.040\$F	Date Executed:	Test Conductor:
Title:	Site Startup Confidence Test	
Objective:	The purpose of this test is to demonstrate a normal startup, operations and shutdown of the ECS site.	
Requirements	Acceptance Criteria	
EOSD3000#A	This requirement is verified by demonstration. The ECS shall provide for security safeguards to cover unscheduled system shutdown (aborts) and subsequent restarts, as well as for scheduled system shutdown and operational startup. System startup and shutdown must be accomplished using the cold startup and normal shutdown procedures documented in the Operator's Manual (611-CD-001-001). This test does not verify unscheduled system shutdown and subsequent restarts. This is verified in 8.1.4 Site Shutdown/Recovery Sequence.	
Test Inputs: EOC Maintenance and Operations Procedures for Release A (DID 609)		

Step-By-Step Procedures		
Step No.	Input Action / Expected Results	Pass / Fail / Comments
	Perform an ECS cold startup in accordance with procedures documented in the <u>EOC Maintenance and Operations Procedures for Release A (DID 609)</u>	
10	Tester: Powers on the system components.	
20	Expected Results: System components respond. This is conveyed by power on indicator lights.	
30	Tester: Initializes the script to startup the system.	
40	Expected Result: Execution of the Startup Script. The Data Management Subsystem (DMS) is initialized. The User Interface Subsystem (FUI) is initialized. The Planning and Scheduling Subsystem (PAS) is initialized. The Command Management Subsystem (CMS) is initialized. The Command Subsystem (CMD) is initialized. The Telemetry Subsystem (TLM) is initialized. The Analysis Subsystem (ANA) is initialized. The Resource Management Subsystem (RMS) is initialized.	
50	Tester: Initializes HP OpenView.	
60	Expected Result: HP OpenView displays on the screen.	
70	Tester: Using the system management agent, configure the display to monitor a specific set of software and hardware elements.	
80	Expected Result: HP OpenView displays the specific set of elements.	
90	Tester: Save the configuration.	
100	Expected Results: The system management agent stores the new display configuration.	
110	Tester: Monitors HP OpenView to insure that all of the subsystems have been initialized.	
120	Expected Results: HP OpenView shows that each of the subsystems are up and running without any problems. This is conveyed by HP OpenView by a green icon representing each of the components.	
130	Tester: Sends out a message to the FOT Spacecraft Activity Controller notifying him that the system is up and running.	
140	Expected Results: A pop up message is displayed on the FOT Spacecraft Activity Controller's screen.	
150	Tester: Monitors the system for 15 minutes.	
160	Expected Results: HP OpenView shows that each of the subsystems are up and running without any problems. This is conveyed by HP OpenView by a green icon representing each of the components.	

	Normal Shutdown	
170	Tester: Sends out a message to the FOT Spacecraft Activity Controller notifying them that the system is going down in T-15 minutes.	
180	Expected Results: A pop up message is displayed on the screens.	
190	Tester: Sends out a message to the FOT Spacecraft Activity Controller notifying him that the system is going down in T-10 minutes.	
200	Expected Results: A pop up message is displayed on the FOT Spacecraft Activity Controller screen.	
210	Tester: Sends out a message to the FOT Spacecraft Activity Controller notifying them that the system is going down in T-1 minute.	
220	Expected Results: A pop up message is displayed on the FOT Spacecraft Activity Controller screen. At Shutdown, the system no longer allows incoming requests.	
230	Tester: Waits for all jobs to complete. If a job running will take longer than 10 minutes to complete the job will be stopped and the originator will be notified. Execute a “ps” command to verify that all processes have completed.	
240	Expected Results. Response to “ps” command denotes that all jobs have completed.	
250	Tester: Shuts down the DMS.	
260	Expected Results: System shuts down the DMS.	
270	Tester: Monitors HP OpenView to see when the DMS has shutdown.	
280	Expected Results: The HP OpenView icon for the DMS turns red denoting the DMS is shutdown.	
290	System Administrator: Shuts down the FUI.	
300	Expected Results: System shuts down the FUI.	
310	Tester: Monitors HP OpenView to see when the FUI has shutdown.	
320	Expected Results: The HP OpenView icon for the FUI turns red denoting the FUI is shutdown.	
330	Tester: Shuts down the PAS.	
340	Expected Results: System shuts down the PAS	
350	Tester: Monitors HP OpenView to see when the PAS has shutdown.	
360	Expected Results: The HP OpenView icon for the PAS turns red denoting the PAS is shutdown.	
370	Tester: Shuts down the CMS.	
380	Expected Results: System shuts down the CMS.	
390	Tester: Monitors HP OpenView to see when the CMS has shutdown.	

400	Expected Results: The HP OpenView icon for the CMS turns red denoting the CMS is shutdown.	
410	Tester: Shuts down the CMD software.	
420	Expected Results: System shuts down the CMD software.	
430	Tester: Monitors HP OpenView to see when the CMD software has shutdown.	
440	Expected Results: The HP OpenView icon for the CMD software turns red denoting the CMD software is shutdown.	
450	Tester: Shuts down the TLM.	
460	Expected Results: System shuts down the TLM	
470	Tester: Monitors HP OpenView to see when the TLM has shutdown.	
480	Expected Results: The HP OpenView icon for the TLM turns red denoting the TLM is shutdown.	
490	Tester: Shuts down the ANA.	
500	Expected Results: System shuts down the ANA.	
510	Tester: Monitors HP OpenView to see when the ANA has shutdown.	
520	Expected Results: The HP OpenView icon for the ANA turns red denoting the ANA is shutdown.	
530	Tester: Shuts down the RMS software.	
540	Expected Results: System shuts down the RMS software.	
550	Tester: Monitors HP OpenView to see when the RMS software has shutdown.	
560	Expected Results: The HP OpenView icon for the RMS software turns red denoting the RMS software is shutdown.	
Data Reduction and Analysis Steps:		
Signature:		Date:

8.1.2.2 Site Restart Including Introduction of Previous Results

TEST Procedure No.: A080120.010\$F	Date Executed:	Test Conductor:
Title:	Site Restart Including Introduction of Previous Results	
Objective:	This test demonstrates the ability of the ECS to perform a warm restart and demonstrates that configuration inputs from the prior operational state are still active following a shutdown and restart process.	
Requirements	Acceptance Criteria	
EOSD3000#A	<p>This requirement is verified though demonstration.</p> <p>The ECS shall provide for security safeguards to cover unscheduled system shutdown (aborts) and subsequent restarts, as well as for scheduled system shutdown and operational startup.</p> <p>The ECS must perform a warm restart and demonstrate the return to the preserved configuration from the previous operational state.</p> <p>This test does not verify “unscheduled system shutdown (aborts) and subsequent restarts” and “scheduled system shutdown. They are verified in 8.1.4 Site Shutdown/Recovery Sequence and 8.1.2.1 Site Startup Confidence Test respectively.</p>	
Test Inputs: EOC Maintenance and Operations Procedures for Release A (DID 609)		

Step-By-Step Procedures		
Step No.	Input Action / Expected Results	Pass / Fail / Comments
	Perform an ECS warm restart in accordance with procedures documented in the <u>EOC Maintenance and Operations Procedures for Release A (DID 609)</u>.	
10	System Administrator: Initializes the script to startup the system.	
20	Expected Result: Execution of the Startup Script. The Data Management Subsystem (DMS) is initialized. The User Interface Subsystem (FUI) is initialized. The Planning and Scheduling Subsystem (PAS) is initialized. The Command Management Subsystem (CMS) is initialized. The Command Subsystem (CMD) is initialized. The Telemetry Subsystem (TLM) is initialized. The Analysis Subsystem (ANA) is initialized. The Resource Management Subsystem (RMS) is initialized.	
30	System Administrator: Initializes HP OpenView.	
40	Expected Result: HP OpenView displays on the screen.	
50	System Administrator: Verifies that the configuration saved in test 8.1.2.1, step 90 is displayed on the screen.	
60	Expected Results: HP OpenView shows that each of the subsystems are up and running without any problems. This is conveyed by HP OpenView by a green icon representing each of the components.	
70	System Administrator: Sends out a message to the FOT Spacecraft Activity Controller notifying him that the system is up and running.	
80	Expected Results: A pop up message is displayed on the FOT Spacecraft Activity Controller screen.	
90	System Administrator: Monitors the system for 15 minutes.	
100	Expected Results: HP OpenView shows that each of the subsystems are up and running without any problems. This is conveyed by HP OpenView by a green icon representing each of the components.	
Data Reduction and Analysis Steps:		
Signature:		Date:

8.1.3 Site Operations Sequence

This sequence does not apply to the EOC Volume of the Acceptance Test Procedures document for Release A.

8.1.4 Site Shutdown/Recovery Sequence

This sequence evaluates the capability of the ECS site to perform documented emergency shutdown procedures. This sequence also evaluates the capability of the ECS site to recover from the abnormal shutdown and to provide continued performance, albeit in a degraded mode, during a device failure. A device failure is simulated during the restart process by forcing the RAID storage device to go off-line.

Configuration: The system configuration needed to perform this sequence of tests are as follows: Real-Time Server, Data Server, Multicast Server, CSS Server, MSS Server, FOT Workstation, IOT Workstation, MSS Workstation, and ISS equipment. Refer to Table 7-2 and Table 7-3 for additional detail.

External Interfaces: There are no external interfaces needed for this sequence.

Operator Position(s): The operator positions from the ECS Maintenance and Operations Position Descriptions document (607/OP2) needed to support this sequence are listed:

DAAC Computer Operator

DAAC System Administrator

DAAC Resource Manager

DAAC Production Monitor

Operational Scenario(s): The operations scenario, taken from the Operations Scenarios for the ECS Project: Release-A document (605/OP1), that was used to develop tests in this sequence of tests are listed:

Computer System Administration Backup & Restore/recovery (Section 3.1.2)

Test Dependencies: The following table identifies the test procedure(s) in a sequence of tests that should be run prior to or concurrently with a sequence or test procedure.

Test Procedure No.	Site/Procedure No.	Comments
A080140.010\$F A080150.010\$F A080150.020\$F	A080170.020\$F	Run A080170.020\$F prior to any test in this sequence.
A080140.010\$F A080150.010\$F A080150.020\$F	A080180.090\$F	Run A080180.090\$F prior to any test in this sequence.
A080150.010\$F	A080620.040\$F	Run A080620.040\$F prior to A080150.010\$F

8.1.4.1 Emergency and Other Abnormal Shutdown

TEST Procedure No.: A080140.010\$F	Date Executed:	Test Conductor:		
Title: Emergency and Other Abnormal Shutdown				
Objective: This confirms that the site's standard procedures contain methodology for responding to catastrophic situations that require immediate site shutdown and for other types of abnormal shutdown such as system critical equipment failure.				
Requirements		Acceptance Criteria		
EOSD3000#A		<p>This requirement is verified through demonstration.</p> <p>The ECS shall provide for security safeguards to cover unscheduled system shutdown (aborts) and subsequent restarts, as well as for scheduled system shutdown and operational startup.</p> <p>The emergency shutdown of the ECS must be accomplished using the procedures documented in the Operator's Manual.</p> <p>This test does not verify “subsequent restarts, as well as for scheduled system shutdown and operational startup”, are not verified in this procedure and are verified in 8.1.2 Site Startup Sequence</p>		
Test Inputs: <u>EOC Maintenance and Operations Procedures for Release A (DID 609)</u>				
Data Set Name	Data Set ID	File Name	Description	Version
		BadCfgFile	Bad File Configuration	

Step-By-Step Procedures		
Step No.	Input Action / Expected Results	Pass / Fail / Comments
10	Computer Operator: Perform an emergency shutdown in accordance with procedures documented in the <u>EOC Maintenance and Operations Procedures for Release A (DID 609)</u>	
20	Expected Results: The system is in the shut down state where each subsystem is offline. A more detailed description of the shutdown state will be incorporated upon completion of the <u>EOC Maintenance and Operations Procedures for Release A (DID 609)</u>	
Data Reduction and Analysis Steps:		
Signature:		Date:

8.1.4.2 Recovery From Catastrophic Emergency Shutdown

TEST Procedure No.: A080150.010\$F	Date Executed:	Test Conductor:
Title:	Recovery From Catastrophic Emergency Shutdown	
Objective:	The purpose of this test is to verify the ECS site can recover from an emergency shutdown.	
Requirements	Acceptance Criteria	
EOSD2990#A	<p>This requirement is verified through demonstration.</p> <p>The ECS elements shall support the recovery from a system failure due to a loss in the integrity of the ECS data or a catastrophic violation of the security system.</p> <p>The system must be able to restore files following a simulated catastrophic violation of the security system.</p> <p>This test procedure does not verify "...the recovery from a system failure due to a loss in the integrity of the ECS data..."</p>	
EOSD3000#A	<p>This requirement is verified through demonstration.</p> <p>The ECS shall provide for security safeguards to cover unscheduled system shutdown (aborts) and subsequent restarts, as well as for scheduled system shutdown and operational startup.</p> <p>The system must be able to restore files following a simulated catastrophic violation of the security system.</p> <p>This test does not verify "unscheduled system shutdown (aborts)" and "scheduled system shutdown and operational startup." They are verified in 8.1.4.1 Emergency and Other Abnormal Shutdown and 8.1.2 Site Startup Sequence respectively.</p>	
Test Inputs: EOC Maintenance and Operations Procedures for Release A (DID 609)		

Step-By-Step Procedures		
Step No.	Input Action / Expected Results	Pass / Fail / Comments
	NOTE A080620.040\$F must be run prior to this test.	
10	Computer Operator: Attempts to bring the system back on-line, but discovers that some key files are missing.	
20	Expected Results: A file listing of the system does not contain the key files.	
30	Computer Operator: Determines that a full restore of the system files from a previous backup will fix the problem. Enters the commands to initialize the scripts to begin the restore.	
40	Expected Results: System initializes the scripts to restore the software.	
50	Computer Operator: Invokes the word processor and moves to the backup directory, to review the log file associated with the backup being restored.	
60	Expected Results: System displays the log file on terminal.	
70	Computer Operator: Selects the backupxxxxxx.log file (where xxxxxx represents the month, day, and year of the backup).	
80	Expected Results: System displays appropriate log file.	
90	Computer Operator: Prints out a copy of the log file.	
100	Expected Results: Prints the log file.	
110	Computer Operator: Exits the log file directory.	
120	Expected Results: System returns to word processor. Restore concludes and an indicator is returned to the operator.	
130	Computer Operator: From the word processor that is already up, opens the file pull down menu and selects open. Then, opens the associated QA report.	
140	Expected Results: System displays the QA report.	
150	Computer Operator: Compares the QA report with the log file from the backup that was restored.	
160	Expected Results the QA report and the log file list the same files.	
170	System Administrator: Initializes the script to startup the system as described in the <u>EOC Maintenance and Operations Procedures for Release A (DID 609)</u>	
180	Expected Results: HP OpenView shows that each of the subsystems are up and running without any problems. This is conveyed by HP OpenView by a green icon representing each of the components.	

Data Reduction and Analysis Steps: a. The following are secured for analysis at the close of the procedure: <ol style="list-style-type: none"> 1. Backup log. 2. QA report. b. Verify the QA report confirms the contents of the files restored from the archive media (listed on the backup log.		
Signature:		Date:

8.1.4.3 Recovery From Abnormal Non-Catastrophic Shutdown

TEST Procedure No.: A080150.020\$F	Date Executed:	Test Conductor:
Title: Recovery From Abnormal Non-Catastrophic Shutdown		
Objective: This test confirms the sites ability to restore files caused by an abnormal non-catastrophic shutdown using standard operational procedures and that the EOC File Server can continue to provide service in the event of a device failure.		
Requirements	Acceptance Criteria	
EOSD2440#A	This requirement is verified through test. Data base integrity including prevention of data loss and corruption shall be maintained. The EOC must be able to restore files corrupted by a file server failure.	
EOSD2990#A	This requirement is verified by demonstration. The ECS elements shall support the recovery from a system failure due to a loss in the integrity of the ECS data or a catastrophic violation of the security system. The DADS must be able to restore files following a simulated system failure due to a loss in the integrity of ECS data. This test procedure does not verify the recovery from "...a catastrophic violation of the security system."	
Test Inputs: EOC Maintenance and Operations Procedures for Release A (DID 609)		

Step-By-Step Procedures		
Step No.	Input Action / Expected Results	Pass / Fail / Comments
10	Computer Operator: Executes a simulated File Server Host disc crash. Views HP OpenView.	
20	Expected Result: The EOC icon in HP OpenView is red.	
30	Computer Operator: Double clicks on the EOC icon to go down to the next level of submaps.	
40	Expected Result: The EOC submap displays on the screen. The FOS-EOC-2 icon is red.	
50	Computer Operator: Double clicks on the FOS-EOC-2 icon to go down to the next level of submaps.	
60	Expected Result: The FOS-EOC-2 submap displays on the screen. The disk drive icon is red.	
70	Computer Operator: Tries to write to the disk and fails. Then, determines the disk has failed.	
80	Expected Results: The disk cannot be written to.	
90	Computer Operator: Initiate the archive media recovery utility (Need to research if and how the SQL build master recovery utility or other recovery utilities will be implemented in EOC Release A).	
100	Computer Operator: Schedules the replacement and restore of the disk with the Database Manager.	
110	Expected Results: Based on the resources needed and the time required to conduct the restore the event is scheduled.	
140	Computer Operator: Retrieves the backup which is stored in a different facility. Enters the commands to initialize the scripts to begin the restore.	
150	Expected Results: System initializes the scripts to restore the File Server Host disc.	
160	Computer Operator: Invokes the word processor and selects "Open" from the file pull down menu to review the log file associated with the backup being restored.	
170	Expected Results: System displays the log file on the terminal.	
180	Computer Operator: Selects the Restorexxxxxx.log (where xxxxxx equal the month, day and year).	
190	Expected Results: System displays appropriate log file.	
200	Computer Operator: Prints out a copy of the log file.	
210	Expected Results: Prints the log file.	
220	Computer Operator: Exits the log file directory.	
230	Expected Results: System returns to word processor. Restore concludes and an indicator is returned to the operator.	

240	Computer Operator: Restores the incremental backups taken since the last system backup to bring the system as close to realtime as possible.	
250	Expected Results: The restores conclude and an indicator is returned to the operator.	
260	Computer Operator: From the word processor that is already up, the QA report associated with the restore.	
270	Expected Results: System displays the QA report.	
280	Computer Operator: Compares the QA report with the log file from the backup that was restored.	
290	Expected Results the QA report and the log file list the same files.	
300	Computer Operator: Verifies that the system is back up and operational.	
310	Expected Results: HP OpenView shows that the EOC icon is up and running without any problems. This is conveyed by HP OpenView by a green icon.	
Data Reduction and Analysis Steps: a. The following are secured for analysis at the close of the procedure: <ol style="list-style-type: none"> 1. Backup log. 2. QA report. b. Verify the QA report confirms the contents of the files restored from the archive media (listed on the backup log.		
Signature:		Date:

8.1.5 Site Maintenance Sequence

This sequence does not apply to the EOC Volume of the Acceptance Test Procedures document for Release A.

8.1.6 Site Data/Metadata/Information Management Sequence

The ECS is evaluated for its ability to store ECS software and key data items in a separate physical location.

Configuration: The system configuration needed to perform this sequence of tests are as follows: Real-Time Server, Data Server, Multicast Server, CSS Server, MSS Server, FOT Workstation, IOT Workstation, MSS Workstation, and ISS equipment. Refer to Table 7-2 and Table 7-3 for additional detail.

External Interfaces: There are no external interfaces needed for this sequence.

Operator Position(s): The operator position from the ECS Maintenance and Operations Position Descriptions document (607/OP2) needed to support this sequence is listed:

FOT Database Manager

Operational Scenario(s): The operations scenario, taken from the Operations Scenarios for the ECS Project: Release-A document (605/OP1), that was used to develop tests in this sequence of tests are listed:

Computer System Administration Backup & Restore/Recovery Scenario (Section 3.1.2)

Test Dependencies: There are no test dependencies needed for this sequence of tests.

8.1.6.2 ECS Storage/Archive/Backup Capability

TEST Procedure No.: A080170.020\$F	Date Executed:	Test Conductor:
Title: ECS Storage/Archive/Backup Capability		
Objective: The purpose of the test is to confirm the site's capability to store, archive, and back up software and key data items.		
Requirements	Acceptance Criteria	
EOSD3200#A	This requirement is verified by test. A minimum of one backup which is maintained in a separate physical location shall be maintained for ECS software and key data items. The Tester verifies the existence of an off-site backup copy of data.	
Test Inputs:		

Step-By-Step Procedures		
Step No.	Input Action / Expected Results	Pass / Fail / Comments
10	FOT Database Manager: Insert the backup media into the storage device. Initialize storage device.	
20	Expected Results: Storage device is initialized.	
50	FOT Database Manager: Load and view contents of backup media.	
60	Expected Results: Backup media blank.	
70	FOT Database Manager: Accesses storage device allocation screen.	
80	Expected Results: Storage device allocation screen appears.	
90	FOT Database Manager: Allocates storage devices for backup.	
100	Expected Results: Storage device allocation screen depicts desired allocations.	
110	FOT Database Manager: Execute Autosys backup software. Initiate system backup.	
120	Expected Results: Backup software executes system backup. Backup completes.	
130	FOT Database Manager: Lists files contained on the backup media. Verifies content of the listing.	
140	Expected Results: Displays files contained on the backup media.	
170	FOT Database Manager: Invokes the word processor to review the QA report on the backup job.	
180	Expected Results: The QA report displays on the screen. The QA report must contain a file listing with the last update date and time and a tapescan with a dump of the first and last file.	
190	FOT Database Manager: Opens the log file. Updates the backup log with an entry indicating the status of the backup. Saves updated backup log.	
200	Expected Results: The log file displays on the terminal. The updated log file is stored.	
210	FOT Database Manager: Insert the backup copy media into another storage device. Initialize this storage device.	
220	Expected Results: Storage device is initialized.	
230	FOT Database Manager: Makes a copy of the backup.	
240	Expected Results: The software performs the copy. Copy completes.	
250	FOT Database Manager: Unload and remove backup media from the storage devices.	
260	FOT Database Manager: Marks the copy for off-site storage. Store backup in protected area. Store backup copy in an off-site protected area.	

270	Expected Results: Backup copy is marked and stored in an off-site protected area in accordance with the <u>Property Management Plan for the ECS Project (602/OP1)</u> . Backup is stored locally in a protected area in accordance with the <u>Property Management Plan for the ECS Project (602/OP1)</u> .	
280	FOT Database Manager: Generates a QA report on the copied media. Reviews the QA report on the copied media.	
290	Expected Results: The Copied media QA report displays on the screen. The QA report must contain a file listing with the last update date and time and a tapescan with a dump of the first and last file.	
300	FOT Database Manager: Updates the backup log with an entry indicating the status of the copy of the backup. Saves updated backup log.	
310	Expected Operator: The log file displays on the terminal. The updated log file is stored.	
Data Reduction and Analysis Steps:		
a. Verify the accounting procedures for handling the backup media is in accordance with the <u>Property Management Plan for the ECS Project (602/OP1)</u> .		
Signature:		Date:

8.1.7 Facilities Interfaces Sequence

This sequence verifies the basic connectivity and fundamental protocols for EOC external and internal interfaces in support of Release A operations. Confirmation of EOC external interfaces (with the FDF and EDOS via FTP) and ECS internal interfaces (with the GSFC DAAC and SMC via E-Mail) is performed through inspection of before and after data transmission products compared to requirements. The bulletin board service is also evaluated. The operational version of external systems are used if they are mature and available at the time of acceptance testing on this sequence. Otherwise, emulators are used.

Configuration: The system configuration needed to perform this sequence of tests are as follows: Real-Time Server, Data Server, Multicast Server, CSS Server, MSS Server, FOT Workstation, IOT Workstation, MSS Workstation, and ISS equipment. Refer to Table 7-2 and Table 7-3 for additional detail.

External Interfaces: The external interfaces (i.e. other ECS sites and data sources) needed for this sequence (both real and emulated) are listed:

- FDF
- EDOS
- GSFC DAAC
- SMC

Operator Position(s): The operator positions from the ECS Maintenance and Operations Position Descriptions document (607/OP2) needed to support this sequence are listed:

- FOT Planner/Scheduler
- FOT Spacecraft Activity Controller
- GSFC DAAC Computer Operator
- SMC Computer Operator

Operational Scenario(s): There are no operations scenarios, taken from the Operations Scenarios for the ECS Project: Release-A (605/OP1), used during this sequence of tests.

Test Dependencies: The following table identifies the test procedure(s) in a sequence of tests that should be run prior to or concurrently with a sequence or test procedure.

Test Procedure No.	Site/Procedure No.	Comments
A080180.090\$F	A080180.090\$G A080180.090\$S	Concurrent

8.1.7.2 EOC External Interfaces

TEST Procedure No.: A080180.030\$F	Date Executed:	Test Conductor:
Title: EOC External Interfaces		
Objective: This test case verifies EOC receipt of emulated FDF and EDOS data using the File Transfer Protocol (FTP).		
Requirements	Acceptance Criteria	
AM1-0070#A	<p>This requirement is verified through test.</p> <p>The AM-1 spacecraft shall have the capability to send (in CADU format) and the EOC shall have the capability to receive (in EDUs containing CCSDS telemetry packets) recorded AM-1 spacecraft and instrument housekeeping telemetry packets (as defined in AM-1 ICD 106) via EDOS/Ebnet and the SN, GN, DSN, or WOTS interfaces.</p> <p>The EOC must be able to receive emulated recorded housekeeping telemetry packets.</p> <p>This test procedure does not verify the GN, DSN, and WOTS interfaces.</p>	
AM1-0130-#A	<p>This requirement is verified through test.</p> <p>The AM-1 spacecraft shall have the capability to send (in CADU format) and the EOC shall have the capability to receive (in EDUs containing CCSDS telemetry packets and CLCWs) recorded AM-1 housekeeping telemetry packets (as defined in AM-1 ICD 106) via pre-launch test configurations which include the AM-1 Spacecraft Checkout Station, Ecom, and EDOS or ETS.</p> <p>The EOC must be able to receive emulated recorded housekeeping telemetry packets.</p> <p>This test procedure does not verify receipt of CLCWs and the Spacecraft Checkout Station interface. The “Ecom” interface has been changed to the “Ebnet” interface.</p>	
AM1-0135-#A	<p>This requirement is verified through test.</p> <p>The AM-1 spacecraft shall have the capability to send (in CADU format) and the EOC shall have the capability to receive (in EDUs containing CCSDS telemetry packets and CLCWs) AM-1 SCC, CTIU, and instrument microprocessor memory dump telemetry packets (as defined in AM-1 ICD 106) via pre-launch test configurations which include the AM-1 Spacecraft Checkout Station, Ecom, and EDOS or ETS.</p>	

EOSD0730#A	<p>This requirement is verified through test.</p> <p>Each ECS element shall be capable of verifying the fidelity of the ECS element interface to:</p> <p>a. Other ECS elements at any time during the lifetime of the ECS</p> <p>b. Entities external to ECS at any time during the lifetime of the ECS</p> <p>The EOC must be able to receive emulated FDF data and emulated EDOS recorded telemetry data via FTP.</p> <p>This test procedure does not verify part a of this requirement.</p>			
ESN-0070#A	<p>This requirement is verified by test.</p> <p>The ESN shall support the intrasite elements data flow requirements identified in this specification.</p> <p>The ISS must provide for connectivity with external interfaces in order to transfer data to the EOC.</p>			
ESN-0280#A	<p>This requirement is verified by test.</p> <p>The ESN shall provide file transfer and management service and as a minimum must include the capability to transfer the following data types:</p> <p>a. Unstructured Text</p> <p>b. Binary Unstructured</p> <p>c. Binary Sequential</p> <p>d. Sequential Text</p> <p>The CSS File Access Service must be able to transfer text and binary files.</p>			
ESN-0290#A	<p>This requirement is verified by test.</p> <p>The file transfer and management service shall be available in interactive and non-interactive services.</p> <p>The CSS File Access Service must provide functionality for interactive and non-interactive transfer of files (send and receive) between two host systems.</p>			
ESN-0300#A	<p>This requirement is verified by test.</p> <p>The file transfer and management non-interactive services shall be able to be scheduled.</p> <p>The CSS File Access Service must provide an option for scheduling file transfers in a batch mode.</p>			
Test Inputs:				
Data Set Name	Data Set ID	File Name	Description	Version
FDFDUM_001			Emulated FDF data	
EDORECRD_001			Emulated EDOS recorded housekeeping telemetry data	
EDODUMP_001			Emulated EDOS instrument microprocessor memory dump telemetry data	

Step-By-Step Procedures		
Step No.	Input Action / Expected Results	Pass / Fail / Comments
10	FOT Planner/Scheduler: Set up the FDF emulator for transfer of FDF data.	
20	Expected Results: The FDF simulator is on and ready for transfer.	
30	FOT Planner/Scheduler: Access Communications Server and invoke the FTP Software.	
40	Expected Results: FTP software windows displays on the screen.	
50	FOT Planner/Scheduler: Specify binary FDF file (FDFDUM_001) to be transferred. Specify the FDF address as the source address and the EOC address as the destination address for the transfer.	
60	FOT Planner/Scheduler: Execute transfer.	
70	FOT Planner/Scheduler: Verify transmission using system logs and data storage facilities.	
80	Expected Results: System logs contain evidence of the transfer.	
90	FOT Planner/Scheduler: Power down the FDF emulator.	
100	FOT Spacecraft Activity Controller: Set up the EDOS emulator for transfer of recorded housekeeping telemetry data.	
110	Expected Results: The EDOS simulator is on and ready for transfer.	
120	FOT Spacecraft Activity Controller: Access Communications Server and invoke the FTP Software.	
130	Expected Results: FTP software windows displays on the screen.	
140	FOT Spacecraft Activity Controller: Specify binary EDOS file (EDORECRD_001) to be transferred. Specify the EDOS address as the source address and the EOC address as the destination address for the transfer.	
150	FOT Spacecraft Activity Controller: Execute transfer.	
160	FOT Spacecraft Activity Controller: Verify transmission using system logs and data storage facilities.	
170	Expected Results: System logs contain evidence of the transfer.	
200	FOT Spacecraft Activity Controller: Set up the EDOS emulator for transfer of instrument microprocessor memory dump data.	
210	Expected Results: The EDOS simulator is on and ready for transfer.	
220	FOT Spacecraft Activity Controller: Access Communications Server and invoke the FTP Software.	
230	Expected Results: FTP software windows displays on the screen.	

240	FOT Spacecraft Activity Controller: Specify binary EDOS file (EDODUMP_001) to be transferred. Specify the EDOS address as the source address and the EOC address as the destination address for the transfer.	
250	FOT Spacecraft Activity Controller: Execute transfer.	
260	FOT Spacecraft Activity Controller: Verify transmission using system logs and data storage facilities.	
270	Expected Results: System logs contain evidence of the transfer.	
280	FOT Spacecraft Activity Controller: Power down the EDOS emulator.	
Data Reduction and Analysis Steps: a. The following are secured for analysis at the close of the procedure: System FTP logs.		
Signature:		Date:

8.1.7.6 ECS Internal Interfaces

TEST Procedure No.: A080180.090\$F	Date Executed:	Test Conductor:
Title: ECS Internal Interfaces		
Objective: This test case verifies the capability of the EOC to communicate with the GSFC DAAC and SMC via E-Mail. It also confirms that the EOC can post messages to the Bulletin Board, access them, and delete them.		
Requirements	Acceptance Criteria	
EOSD0730#A	<p>This requirement is verified through test.</p> <p>Each ECS element shall be capable of verifying the fidelity of the ECS element interface to:</p> <ul style="list-style-type: none"> a. Other ECS elements at any time during the lifetime of the ECS b. Entities external to ECS at any time during the lifetime of the ECS <p>The EOC must be able to send messages to the GSFC DAAC and SMC via E-Mail and Bulletin Board.</p> <p>This test procedure does not verify part b of this requirement.</p>	
ESN-0010#A	<p>This requirement is verified by test.</p> <p>ESN shall provide the following standard services:</p> <ul style="list-style-type: none"> a. Data Transfer and Management Services b. Electronic Messaging Service c. Remote Terminal Service d. Process to Process Communication Service e. Directory and User Access Control Service f. Network Management Service g. Network Security and Access Control Service h. Internetwork Interface Services i. Bulletin Board Service <p>The CSS Electronic Mail Service must allow the users to create, modify and delete messages. The CSS Electronic Mail Service must provide the ability to send and receive messages. The CSS Electronic Mail Service must provide the ability to attach files to messages.</p> <p>This test does NOT verify parts c, e, f and g of the requirement.</p>	
ESN-0340#A	<p>This requirement is verified by test.</p> <p>The ESN shall interoperate and exchange messages and data with external SMTP and X.400 mail systems.</p> <p>The Tester must verify the ability to provide translation between SMTP and X.400 protocols by creating a message in one protocol and sending/receiving it in another.</p>	
ESN-0345#A	<p>This requirement is verified by test.</p> <p>The ESN shall be capable of transparently transmitting Multi-purpose Internet Mail Extensions (MIME) messages.</p> <p>The CSS Electronic Mail Service must be capable of sending and receiving the Multi-purpose Internet Mail Extensions (MIME) messages.</p>	

ESN-0350#A	<p>This requirement is verified by test.</p> <p>The Electronic Messaging Service shall be capable of exchanging binary data.</p> <p>The CSS Electronic Mail Service must allow attaching either text or binary files to a message.</p>			
ESN-0450#A	<p>This requirement is verified by test.</p> <p>The ESN shall provide process-to-process communication service.</p> <p>The CSS Message service must provide an API for senders to send messages to receivers asynchronously without waiting for the receivers to receive it.</p>			
ESN-1170#A	<p>This requirement is verified by test. The ESN must provide necessary translation within supported file transfer and e-mail services.</p> <p>The CSS Electronic Mail Service must provide translation between SMTP and X.400 protocol.</p>			
ESN-1181#A	<p>This requirement is verified by demonstration.</p> <p>The ESN shall provide an ECS Bulletin Board capability.</p> <p>The CSS Bulletin Board Service must allow the users to post messages to and delete messages from bulletin board(s). The CSS Bulletin Board Service must provide the capability for copying files. The CSS Bulletin Board Service must support multiple bulletin boards. The CSS Bulletin Board Service must allow multiple messages for each bulletin board.</p>			
ESN-1350#A	<p>This requirement is verified by inspection.</p> <p>The ESN LANs shall provide physical devices and the corresponding medium access control (MAC) protocol compatible with ISO and ANSI standards.</p> <p>The Tester reviews the physical devices' specs and verifies that the medium access control (MAC) protocol is compatible with ISO and ANSI standards.</p> <p>Change verification method from analysis to inspection.</p>			
Test Inputs: Valid account names and passwords for accounts at the GSFC DAAC, SMC and EOC.				
Data Set Name	Data Set ID	File Name	Description	Version
EMAIL_001			Sample E-Mail message	
EMAIL_002			Sample E-Mail attachment	

Step-By-Step Procedures		
Step No.	Input Action / Expected Results	Pass / Fail / Comments
	E-Mail Message Transfer Within ECS	
10	EOC Tester: Access Communications Server and invoke E-mail client.	
20	EOC Tester: Creates a new message. Specifies E-mail address at GSFC DAAC. Specifies subject and body of message to be sent to GSFC DAAC. Attaches file to the message. Sends the message to GSFC DAAC.	
40	EOC Tester: Creates a new message. Specifies E-mail address at SMC. Specifies subject and body of message to be sent to SMC. Attaches text and binary files to the message. Sends the message to SMC.	
60	EOC Tester: Views EOC E-mail logs to verify transmission of each E-mail message.	
70	Expected Results: System logs reflect transmission of each E-mail message.	
80	GSFC DAAC Computer Operator: Views E-mail. The message is inspected for evidence of transmission errors.	
90	Expected Results: The message transmission does not contain any evidence of transmission errors, such as garbled text.	
100	GSFC DAAC Computer Operator: Creates a reply message specifying E-mail address at EOC as well as the subject and body of message. Sends the message to EOC.	
110	EOC Tester: Opens reply message verifying receipt of reply message. Prints and deletes message.	
120	Expected Results: The hardcopy is available from the printer. The message no longer resides in the In box.	
180	SMC Computer Operator: Views E-mail. The message is inspected for evidence of transmission errors.	
190	Expected Results: The message transmission does not contain any evidence of transmission errors, such as garbled text.	
200	SMC Computer Operator: Creates a reply message specifying E-mail address at EOC as well as the subject and body of message. Sends the message to EOC.	
210	EOC Tester: Opens reply message verifying receipt of reply message. Prints and deletes message.	
220	Expected Results: The hardcopy is available from the printer. The message no longer resides in the In box.	
	Bulletin Board Service	
280	EOC Tester: Creates multiple messages and posts them to a bulletin board.	
290	EOC Tester: Accesses the bulletin board and verifies that the messages are present.	

300	Expected Result: The messages are accessible through the bulletin board.	
310	EOC Tester: Creates multiple messages and posts them to multiple bulletin boards.	
320	EOC Tester: Accesses the bulletin boards and verifies that the messages are present.	
330	Expected Result: The messages are accessible through the bulletin boards.	
340	EOC Tester: Copies a file from the bulletin board.	
350	Expected Result: Lists the contents of the directory to verify the receipt of the downloaded file.	
360	EOC Tester: Deletes a message from the bulletin board.	
370	Expected Result: The bulletin board refreshes without the deleted message reflecting the deletion.	
380	EOC Tester: Accesses a different bulletin board and deletes multiple messages.	
390	Expected Result: The bulletin board refreshes without the deleted messages reflecting the deletions.	
Data Reduction and Analysis Steps:		
Signature:		Date:

8.2 Scheduling Scenario

This scenario does not apply to the EOC Volume of the Acceptance Test Procedures document for Release A.

8.3 ECS Site Upgrade Scenario

This scenario does not apply to the EOC Volume of the Acceptance Test Procedures document for Release A.

8.4 Configuration Management Scenario

This scenario conducts the site operations staff through the ECS capability for performing system-level configuration management. Resource management procedures are evaluated for effective, complete and prompt coordination and movement between ECS sites, of resources, and resource related procedures and permissions, such as operational directives and COTS software usage licenses and unlicensed toolkits. The logistics management activities are assessed for their combined ability to monitor and communicate information concerning spares and consumable inventories and replenishment.

The completeness, effectiveness and the degree of comprehensives of the ECS capability for controlling and maintaining system-wide inventories including evaluation of previous or on-going inventory procedures is assessed. The ECS capability for collecting controlling, maintaining and distributing ECS system-level policies and procedures is evaluated as well as the capability of providing, maintaining, and updating a bulletin board service for publishing current ECS status, events, news and toolkit references and updates. AT configuration management evaluations include assessment of the ECS network management capability for providing control of network configuration parameters and resources.

8.4.1 Resource Management Sequence

This sequence conducts the testers through ECS resource management activities for providing system-level information, equipment and software resources to the EOC. The LSM capability for conveying, monitoring and reporting to the SMC on the status and progress of the implementation of these activities is confirmed.

Configuration: The system configuration needed to perform this sequence of tests are as follows: Real-Time Server, Data Server, Multicast Server, CSS Server, MSS Server, FOT Workstation, IOT Workstation, MSS Workstation, and ISS equipment. Refer to Table 7-2 and Table 7-3 for additional detail.

External Interfaces: The external interfaces (i.e. other ECS sites and data sources) needed for this sequence (both real and simulated) are listed:

SMC

Operator Position(s): The operator positions from the ECS Maintenance and Operations Position Descriptions document (607-CD-001-002) needed to support this sequence are listed:

FOT Spacecraft Activity Controller

Operational Scenario(s): The operations scenarios, taken from the Operations Scenarios for the ECS Project: Release-A document (605-CD-001-003), that were used to develop tests in this sequence of tests are listed:

Resource Planning Scenario (section 3.7)

Resource Management and Control Scenario (section 3.8)

Test Dependencies: The following table identifies the test procedure(s) in a sequence of tests that should be run prior to or concurrently with a sequence or test procedure.

Test Procedure No.	Site/Procedure No.	Comments
A080410.010\$F	A080410.010\$\$	prior

8.4.1.1 Resource Management Directive

TEST Procedure No.: A080410.010\$F		Date Executed:		Test Conductor:	
Title: Resource Management Directive					
Objective: This procedure investigates the site's ability to display SMC-generated security directives and directives involving the status, resource allocation, and upgrade of hardware and systems software.					
Requirements		Acceptance Criteria			
EOSD2660#A		<p>This requirement is verified by the demonstration method.</p> <p>ECS elements shall at all times maintain and comply with the security directives issued by the SMC.</p> <p>The Tester demonstrates that the system provides the capability to view a security directive that was previously transmitted and stored in the database from the SMC.</p>			
SMC-2115#A		<p>This requirement is verified by the demonstration method.</p> <p>The LSM shall convey for site or element implementation, the managerial and operational directives regarding the allocation or upgrade of any hardware and scientific and systems software.</p> <p>The Tester demonstrates that the system provides the capability to display a policy, procedure, or directive that was previously transmitted and stored in the database from the SMC.</p>			
Test Inputs:					
Data Set Name	Data Set ID	File Name	Description	Version	
Resource Directives			Hard/soft copies		

Step-By-Step Procedures		
Step No.	Input Action / Expected Results	Pass / Fail / Comments
10	FOT Spacecraft Activity Controller: Logon to the MSS workstation at the EOC. The office automation tools must be available on the workstation.	
20	FOT Spacecraft Activity Controller: Select the tools option from the menu.	
30	Expected Results: The tools menu is displayed.	
40	FOT Spacecraft Activity Controller: Select the option for office automation.	
50	Expected Results: The office automation menu is displayed.	
60	FOT Spacecraft Activity Controller: Select the option for GhostView and follow directions to view a document.	
70	note: To view a policy, procedure, or directive that was previously transmitted and stored in the database from the SMC. FOT Spacecraft Activity Controller: Choose open under the file button and select the desired file to view.	
80	Expected Results: The selected file is displayed.	
90	FOT Spacecraft Activity Controller: Select the print button.	
100	Expected Results: The selected file is printed.	
110	FOT Spacecraft Activity Controller: Select close to close the desired file.	
120	FOT Spacecraft Activity Controller: Select quit to exit the processor.	
130	Expected Results: The MSWindows Program Manager appears.	
140	note: To view the EOC files for operational status, resource allocations, or any system upgrades. FOT Spacecraft Activity Controller: Select the MSWindows option from under the Office Automation option.	
150	Expected Results: The MSWindows' Program Manager is displayed.	
160	FOT Spacecraft Activity Controller: Select the file button.	
170	Expected Results: The file menu is displayed under a disk drive.	
180	FOT Spacecraft Activity Controller: Select the correct disk drive and the file in either Microsoft Word or Excel format and select the open button to view the document.	
190	Expected Results: The document is displayed.	
200	FOT Spacecraft Activity Controller: Select print to print the document if desired.	
210	FOT Spacecraft Activity Controller: Insert or delete changes into the desired file, then select save.	

220	Expected Results: The changes are saved in the document.	
230	FOT Spacecraft Activity Controller: To exit the processor select quit.	
240	Expected Results: The MSWindows program manager appears.	
250	FOT Spacecraft Activity Controller: To end this test exit Windows.	
260	Expected Results: Windows exits.	
Data Reduction and Analysis Steps:		
Signature:		Date:

8.4.2 Maintenance Management Sequence

This sequence does not apply to the EOC Volume of the Acceptance Test Procedures document for Release A.

8.4.3 Logistics Management Sequence

This sequence reviews ECS capabilities for managing system-level logistics management activities and for managing system-level personnel and resources in logistics control activities. EOC policies and procedures are inspected for the existence and completeness of procedures for receiving logistics management directives and for monitoring, statusing and reporting to SMC on EOC activities in response to logistics related directives.

Configuration: The system configuration needed to perform this sequence of tests are as follows: Real-Time Server, Data Server, Multicast Server, CSS Server, MSS Server, FOT Workstation, IOT Workstation, MSS Workstation, and ISS equipment. Refer to Table 7-2 and Table 7-3 for additional detail.

External Interfaces: There are no external Interfaces needed for this sequence.

Operator Position(s): The operator positions from the ECS Maintenance and Operations Position Descriptions document (607-CD-001-002) needed to support this sequence are listed:

FOT Spacecraft Activity Controller

Operational Scenario(s): There are no operations scenarios taken from the Operations Scenarios for the ECS Project: Release-A, used during this sequence of tests.

Test Dependencies: There are no test dependencies for this sequence.

8.4.3.1 Logistics Monitoring

TEST Procedure No.: A080430.010\$F	Date Executed:	Test Conductor:
Title: Logistic Monitoring		
Objective: This test case verifies that the LSM has the capability to monitor the spares and consumables inventory.		
Requirements	Acceptance Criteria	
SMC-2305#A	The verification method used is demonstration. The LSM shall monitor the spares inventory within its element. The EOC must provide the capability to use the LSM logistics monitoring procedure information, track the location, quantity, status, and consumption rate concerning spares and consumables.	

SMC-2325#A	<p>The verification method used is demonstration.</p> <p>The LSM shall monitor the consumable inventory within its element for items used by the system including, at a minimum:</p> <ul style="list-style-type: none">a. Computer tapesb. Computer disksc. Computer paper <p>The EOC must provide the capability to manually input the required list of consumables and a spare part to be displayed (computer tapes, disks, and paper), and record the quantity and status of three consumable items (computer tapes, computer disks, and computer paper) as contained in the data base.</p>			
Test Inputs: Lists of inventory for spares and consumables such as, computer tapes, disks, and paper.				
Data Set Name	Data Set ID	File Name	Description	Version

Step-By-Step Procedures		
Step No.	Input Action / Expected Results	Pass / Fail / Comments
10	FOT Spacecraft Activity Controller: Login to ECS	
20	FOT Spacecraft Activity Controller: Open the Inventory file management directory.	
30	Expected Result: Inventory file is ready for access.	
40	FOT Spacecraft Activity Controller: Using the LSM logistics monitoring procedure information, track the location, quantity, status, and consumption rate concerning spares and consumables.	
50	FOT Spacecraft Activity Controller: Manually input the required list of consumables and spare part to be displayed (computer tapes, disks, and paper). Record the quantity and status of three consumable items (computer tapes, computer disks, and computer paper) as contained in the data base.	
60	Expected Result: All required characteristics for running the query is recorded and processed.	
70	FOT Spacecraft Activity Controller: A physical inspection of the inventory is made at the site to obtain the actual quantity and status of the three consumable items.	
80	Expected Result: The inventory list of the computer consumables and spare part is the same as the result of the physical inspection.	
90	FOT Spacecraft Activity Controller: Compare the computer generated inventory list with the test input supplied list.	
100	Expected Result: There is no discrepancies between the data base information and the quantity and status of consumable items and spare parts actually available at the site.	
110	FOT Spacecraft Activity Controller: Record any missing inventory or discrepancy in the evaluation report. The lists should compare.	
120	Expected Result: The lists compare.	
Data Reduction and Analysis Steps:		
Signature:		Date:

8.4.3.2 Logistics Replenishment

TEST Procedure No.: A080430.020\$F		Date Executed:		Test Conductor:	
Title: Logistics Replenishment					
Objective: This test case verifies that the LSM has the capability to manage, replenishment of spare parts and consumable items.					
Requirements		Acceptance Criteria			
SMC-2315#A		This requirement is verified by demonstration. The LSM shall manage the replenishment of spare parts within its element. The EOC must provide the capability to replenish spare parts and consumable items.			
SMC-2335#A		This requirement is verified by demonstration. The LSM shall manage the replenishment of consumable items for its element. The EOC must provide the capability to replenish spare parts and consumable items.			
Test Inputs: Lists of inventory for spares and consumables such as, computer tapes, disks, and paper.					
Data Set Name	Data Set ID	File Name	Description	Version	

Step-By-Step Procedures		
Step No.	Input Action / Expected Results	Pass / Fail / Comments
10	FOT Spacecraft Activity Controller: Review the procedures for overseeing and managing, respectively, the replenishment of spare parts and consumable items.	
20	FOT Spacecraft Activity Controller: Login to ECS.	
30	FOT Spacecraft Activity Controller: Open the Inventory file management directory.	
40	Expected Result: Inventory file is ready for access.	
50	FOT Spacecraft Activity Controller: Bring up the data base and change the current quantities of consumable items accordingly.	
60	FOT Spacecraft Activity Controller: Manually input the required list of consumables and spare part to be displayed (computer tapes, disks, and paper).	
70	Expected Result: All required characteristics for running the query is recorded and processed.	
80	FOT Spacecraft Activity Controller: List the consumables and spare part.	
90	Expected Result: The inventory list of the computer consumables and spare part is displayed.	
100	FOT Spacecraft Activity Controller: Check consumerable and spare part list for shortfalls.	
110	Expected Result: If a shortfall exists an alert or warning message will be generated and displayed. No shortfalls should exist.	
120	FOT Spacecraft Activity Controller: Order any shortfall item.	
130	Expected Result: Change in the data base to indicate the items have been ordered.	
140	FOT Spacecraft Activity Controller: Record any discrepancy in the new inventory list.	
Data Reduction and Analysis Steps:		
Signature:		Date:

8.4.4 Training Management Sequence

This sequence provides the methodology for the inspection of ECS capabilities for managing system-level training. EOC procedures are inspected for the existence and completeness of procedures for receiving training management directives and for monitoring, statusing and reporting to SMC on site activities in response to SMC-originated training directives. The procedures, at the EOC, are inspected for the existence and completeness of procedures for applying available SMC training resources within their assigned facilities.

Configuration: The system configuration needed to perform this sequence of tests are as follows: Real-Time Server, Data Server, Multicast Server, CSS Server, MSS Server, FOT Workstation, IOT Workstation, MSS Workstation, and ISS equipment. Refer to Table 7-2 and Table 7-3 for additional detail.

External Interfaces: The external interfaces (i.e. other ECS sites and data sources) needed for this sequence (both real and simulated) are listed :

SMC

Operator Position(s): The operator positions from the ECS Maintenance and Operations Position Descriptions document (607-CD-001-002) needed to support this sequence are listed:

DAAC Operations Supervisor

SMC Training Staff

Operational Scenario(s): There are no operations scenarios taken from the Operations Scenarios for the ECS Project: Release-A, used during this sequence of tests.

Test Dependencies: The following table identifies the test procedure(s) in a sequence of tests that should be run prior to or concurrently with a sequence or test procedure.

Test Procedure No.	Site/Procedure No.	Comments
A080640.030\$F	A080640.030\$S	concurrent

8.4.4.1 ECS Training and Certification Program Management

TEST Procedure No.: A080440.010\$F		Date Executed:		Test Conductor:	
Title: ECS Training and Certification Program Management					
Objective: This test procedure verifies that the EOC coordinates with the SMC in managing the EOC training program and receives training information from the SMC					
Requirements		Acceptance Criteria			
SMC-2405#A		This requirement is verified through analysis. The LSM shall coordinate with the SMC in managing the training program for its element. EOC training management procedures must exist, and the FOT must be able to use the training procedures for coordinating with the SMC staff on schedule training courses using OA tools, E-Mail, or phone.			
SMC-2415#A		This requirement is verified through analysis. The LSM shall receive from the SMC descriptions and schedules for training courses. The EOC must be able to query the training database, receive descriptions and schedules for training courses from the SMC, and register FOT personnel for training.			
Test Inputs: Written plans for conducting training and certification programs for the ECS. Training database.					
Data Set Name	Data Set ID	File Name	Description	Version	

Step-By-Step Procedures		
Step No.	Input Action / Expected Results	Pass / Fail / Comments
10	FOT Spacecraft Activity Controller: Review the procedures for the overseeing and managing of training and certification programs for ECS.	
20	Expected Result: The procedures determining training requirements for various operator positions, tracking resources for training, and maintaining training course information are reviewed.	
30	FOT Spacecraft Activity Controller: Login to ECS.	
40	FOT Spacecraft Activity Controller: Open the file from the SMC containing plans for conducting training and certification programs for ECS..	
50	Expected Result: File open and ready for access.	
60	FOT Spacecraft Activity Controller: Using the site information on the personnel training needs, the number of people requiring training, and unique training requirements, query the database for the purpose of scheduling a training course.	
70	Expected Result: Information is collected from the training database.	
80	FOT Spacecraft Activity Controller: Schedule a training course from the SMC.	
90	Expected Result: The SMC training staff contacts the site FOT Spacecraft Activity Controller, via E-Mail, to obtain information on the personnel training needs, and the number of people requiring training.	
100	SMC Training Staff: Using the Training database, the information is accessed in the following planning activities: scheduling dates of training courses, developing training courses, scheduling training resources (system equipment, software, instructional materials), and scheduling personnel to support training.	
110	Expected Result: A training course is scheduled.	
120	SMC Training Staff: The training database is updated with all of the scheduling information and formatted into a Training Schedule Report.	
130	Expected Result: The training schedule report is disseminated to the FOT Spacecraft Activity Controller via the ECS training bulletin board as the proposed training schedule.	
140	Expected Result: Training registration for the course is done by E-Mail. A confirmation of the training registration application is transferred via E-Mail.	
Data Reduction and Analysis Steps:		
Signature:		Date:

8.4.5 Inventory Management Sequence

This sequence provides the methodology for test inspection of ECS capabilities for providing and maintaining a configuration management (CM) system, maintaining inventory data bases, and managing inventory policy and procedures.

Configuration: The system configuration needed to perform this sequence of tests are as follows: Real-Time Server, Data Server, Multicast Server, CSS Server, MSS Server, FOT Workstation, IOT Workstation, MSS Workstation, and ISS equipment. Refer to Table 7-2 and Table 7-3 for additional detail.

External Interfaces: There are no external Interfaces needed for this sequence.

Operator Position(s): The operator positions from the ECS Maintenance and Operations Position Descriptions document (607-CD-001-002) needed to support this sequence are listed:

FOT Spacecraft Activity Controller

Operational Scenario(s): The operations scenarios, taken from the Operations Scenarios for the ECS Project: Release-A document (605-CD-001-003), that were used to develop tests in this sequence of tests are listed:

Configuration Management Scenario (Section 3.4)

Test Dependencies: There are no test dependencies for this sequence.

8.4.5.1 Inventory and Configuration Management

TEST Procedure No.: A080450.010\$F		Date Executed:		Test Conductor:	
Title:		Inventory and Configuration Management			
Objective		To verify that the LSM can establish and maintain an inventory data base of hardware and system software and provide a configuration management (CM) capability.			
Requirements		Acceptance Criteria			
SMC-2515#A		This requirement is verified by the test method. The LSM shall provide configuration management for at least the operational hardware, system software, and scientific software within its element and for the migration of enhancements into the operational system. The EOC must provide the capability for maintaining the inventory of EOC hardware and system software. This test does not verify configuration management for scientific software.			
Test Inputs:		System inventory data base file of all the hardware and system software contained in the EOC.			
Data Set Name	Data Set ID	File Name	Description	Version	

Step-By-Step Procedures		
Step No.	Input Action / Expected Results	Pass / Fail / Comments
10	FOT Spacecraft Activity Controller: Review the documentation for maintaining the inventory of hardware and system software on a system-wide basis.	
20	FOT Spacecraft Activity Controller: Log onto a workstation.	
30	Expected Results: Successful login.	
40	FOT Spacecraft Activity Controller: Bring up and access the data base, which contains CM information .	
50	FOT Spacecraft Activity Controller: Check for the established SMC created inventory and configuration management files, using the Clearcase tool.	
60	Expected Result: The files will be identified and located for input/output.	
70	FOT Spacecraft Activity Controller: Select data base information containing one hardware item .	
80	FOT Spacecraft Activity Controller: Print the inventory log file information for the one hardware item that contains the, hardware ID numbers, version numbers and dates, manufacturer, part number, and serial number.	
90	Expected Result: The inventory file will be printed.	
100	FOT Spacecraft Activity Controller: Inspect the identification numbers, manufacturer, part number, and serial number of the actual hardware item and record this information.	
120	Expected Result: The data base information compares with results of the hardware inspection. There should be no discrepancies between the information contained in the data base and the actual items selected for inspection.	
130	FOT Spacecraft Activity Controller: Select data base information containing one software item .	
140	FOT Spacecraft Activity Controller: Print the inventory log file information for the one software item that contains the, version numbers and dates, name and locator info for software maintenance, and the location where the software is used.	
150	Expected Result: The inventory file will be printed.	
160	FOT Spacecraft Activity Controller: Inspect the version numbers and dates, name and locator info for software maintenance, and the location where the software is used.	
170	Expected Result: The data base information compares with results of the software inspection. There should be no discrepancies between the information contained in the data base and the actual item selected for inspection.	
Data Reduction and Analysis Steps:		
Signature:		Date:

8.4.5.2 LSM Enhancement Migration and Inventory Management

TEST Procedure No.: A080450.030\$F	Date Executed:	Test Conductor:		
Title: LSM Enhancement Migration and Inventory Updating				
Objective: To verify the capability of the LSM to update the system-wide inventory data base and provide CM for the migration of upgrades and enhancements into the operational system for site-specific items.				
Requirements		Acceptance Criteria		
SMC-2505#A		The Demonstration method is used to verify these capabilities. The LSM shall update the system-wide inventory data base consisting of all hardware, system software, and scientific software contained within its element. The EOC must provide the capability for updating the inventory data base for hardware and system software. This test procedure does not verify updating the system-wide inventory data base for scientific software.		
Test Inputs: Inventory data base file containing operational system upgrades and enhancements. System must have a configuration management capability in place.				
Data Set Name	Data Set ID	File Name	Description	Version

Step-By-Step Procedures		
Step No.	Input Action / Expected Results	Pass / Fail / Comments
10	FOT Spacecraft Activity Controller: Review the documentation for updating the inventory data base for hardware and system software.	
20	FOT Spacecraft Activity Controller: Use this information to update the data base containing CM information for hardware.	
30	FOT Spacecraft Activity Controller: Log onto a workstation.	
40	Expected Results: Successful login.	
50	FOT Spacecraft Activity Controller: Check for the establishment of inventory and configuration management files, using the Clearcase tool load the inventory file.	
60	Expected Result: Inventory file will be loaded and ready for input/output.	
70	FOT Spacecraft Activity Controller: Retrieve data base information about one specified hardware item.	
80	Expected Result: The identification number, manufacturer, part number, and serial number of the hardware item should be displayed.	
90	FOT Spacecraft Activity Controller: Identify the hardware item to be replaced and provide the ID number, manufacturer, part number, and serial number of the new H/W item. Make the file change.	
100	Expected Result: The original H/W item will be replaced with the new one. This new H/W configuration will be reflected in the inventory data base with the identification number, manufacturer, part number, and serial number of the new hardware item.	
110	FOT Spacecraft Activity Controller: Close out the inventory file.	
120	Expected Result: File will be closed.	
130	FOT Spacecraft Activity Controller: Using Clearcase, load the CM file containing information about the system software data base.	
140	Expected Result: The S/W data base file is opened for I/O operations.	
150	FOT Spacecraft Activity Controller: Print information for a selected processor from the system software data base file, which contains at a minimum the processor name, version, and maintenance performed.	
160	Expected Result: The selected processor information including processor name, version, and maintenance performed is printed.	
170	FOT Spacecraft Activity Controller: Identify the software processor to be replaced and provide the processor name, version, and maintenance performed of the new S/W processor. Make the file change.	

180	Expected Result: The original software processor is replaced with the new one. This new S/W configuration will be reflected in the inventory data base with the processor name, version, and maintenance performed of the new software processor.	
190	FOT Spacecraft Activity Controller: Inspect and compare the printed output with the current software configuration and record any discrepancies. There should not be any discrepancies.	
191	FOT Spacecraft Activity Controller: Reset all data base items to there original values.	
200	Tester: Close the data base file.	
210	FOT Spacecraft Activity Controller: Log off of the work station.	
Data Reduction and Analysis Steps:		
Signature:		Date:

8.4.6 Quality Management Sequence

This sequence does not apply to the EOC Volume of the Acceptance Test Procedures document for Release A.

8.4.7 Policies and Procedures Management Sequence

This sequence conducts an inspection of EOC/LSM procedures and policies for supporting, controlling and maintaining EOC policies and procedures covering site responsibility and authority, resource management, fault recovery, testing, maintenance, logistics, training, inventory management, system enhancements, and administrative actions.

Configuration: The system configuration needed to perform this sequence of tests are as follows: Real-Time Server, Data Server, Multicast Server, CSS Server, MSS Server, FOT Workstation, IOT Workstation, MSS Workstation, and ISS equipment. Refer to Table 7-2 and Table 7-3 for additional detail.

External Interfaces: There are no external Interfaces needed for this sequence.

Operator Position(s): The operator positions from the ECS Maintenance and Operations Position Descriptions document (607-CD-001-002) needed to support this sequence are listed:

FOT Spacecraft Activity Controller

Operational Scenario(s): The operations scenarios, taken from the Operations Scenarios for the ECS Project: Release-A document (605-CD-001-003), that were used to develop tests in this sequence of tests are listed:

Fault Management Scenario (Section 3.3)

Test Dependencies: The following table identifies the test procedure(s) in a sequence of tests that should be run prior to or concurrently with a sequence or test procedure.

Test Procedure No.	Site/Procedure No.	Comments
A080480.020\$F	A080480.020\$S	prior
A080480.010\$F	A080480.010\$S	prior

8.4.7.1 Policies and Procedures Control

TEST Procedure No.: A080480.010\$F	Date Executed:	Test Conductor:
Title:	Policies and Procedures Control	
Objective:	To verify the overall support and control of policies and procedures affecting the ECS.	
Requirements	Acceptance Criteria	
EOSD2100#A	<p>This requirement is verified through inspection.</p> <p>The ECS technical security policy planning shall be comprehensive and shall cover at least the following areas:</p> <ul style="list-style-type: none">a. Applicability of the C2 Level of Trustiness as defined by the NSAb. Applicability of the C2 Object Reuse capabilityc. Discretionary control and monitoring of user accessd. ECS communications, network access, control, and monitoringe. Computer system "virus" monitoring, detection, and remedyf. Data protection controlsg. Account/privilege management and user session tailoringh. Restart/recoveryi. Security audit trail generationj. Security analysis and reportingk. Risk analysis <p>Compliance for this requirement is demonstrated in DID 214/SE1. The security management policies and procedures at the EOC must provide for password management, operational security, data classification, access privileges, system hardware and software maintenance, and spare parts inventory guidelines.</p>	
EOSD2200#A	<p>This requirement is verified through inspection.</p> <p>Selection criteria meeting overall ECS security policies and system requirements shall be applied when selecting hardware.</p> <p>Compliance for this requirement is demonstrated in DID 214/SE1. A security section must be provided within all applicable documents at the EOC and is current with the ECS approved documentation.</p>	
Test Inputs:	Copies of the policies and procedures affecting the ECS, such as, site authority, resource management, fault recovery, testing, simulations, maintenance, logistics, performance evaluation, training, quality and product assurance, inventory management, system enhancements, administrative actions, and security.	

Step-By-Step Procedures		
Step No.	Input Action / Expected Results	Pass / Fail / Comments
10	FOT Spacecraft Activity Controller: Confirm that the site receives system-level policies from the SMC. Verify that principal ECS operational functions at the site are provided for in the management and control of ESDIS/ECS policies and procedures.	
20	FOT Spacecraft Activity Controller: Verify through inspection that the security management policies and procedures at the site includes password management, operational security, data classification, access privileges, system hardware and software maintenance, and spare parts inventory guidelines.	
30	FOT Spacecraft Activity Controller: Confirms that the LSM uses methods and procedures appropriate for controlling policies and procedures as well as pertinent correspondence at the system-wide and site level, respectively.	
40	FOT Spacecraft Activity Controller: Confirms that the policies and procedures are sufficiently expanded to provide a level of detail necessary for implementation at the site.	
50	Expected Results: Inspections and confirmations are successful. For specifics refer to DID 609 and DID 214 Security Policy.	
60	FOT Spacecraft Activity Controller: Verify through inspection that the ECS security policy covers the following areas, C2 level of security, communications, virus monitoring, protection controls, system restart/recovery, security audit trail generation, security analysis and reporting, and risk analysis.	
70	Expected Results: Inspection is successful. Specifics about compliance is demonstrated in DID 214/SE1.	
80	FOT Spacecraft Activity Controller: Verify through inspection that the security section within all documents at the site are current with the ECS approved documentation.	
90	Expected Results: Inspection is successful.	
100	FOT Spacecraft Activity Controller: Verify that backup copies of the policy and procedure manuals are maintained at a separate physical location at the site	
110	Expected Results: Verification is successful.	
Data Reduction and Analysis Steps:		
Signature:		Date:

8.4.7.2 Policies and Procedures Maintenance

TEST Procedure No.: A080480.020\$F	Date Executed:	Test Conductor:
Title: Policies and Procedures Maintenance		
Objective: To verify that the LSM provides a bulletin board service with information on ECS status, events, and news so that ESDIS, SMC, and LSM policies and procedures and directives can be properly maintained and distributed. It confirms that access to updating this information is limited to specified personnel with the proper ECS responsibility and authority.		
Requirements	Acceptance Criteria	
EOSD1990#A	<p>This requirement is verified through inspection.</p> <p>The ECS system and elements shall employ security measures and techniques for all applicable security disciplines which are identified in the preceding documents. These documents must provide the basis for the ECS security policy.</p> <p>The interpretation criteria for this requirement is as determined in the technical security planning policy activity documented in EOSD2100, and is verified in the previous procedure (A080480.010).</p> <p>The EOC must show that there are security measures and techniques for all applicable security disciplines.</p>	
EOSD2100#A	<p>This requirement is verified through inspection.</p> <p>The ECS technical security policy planning shall be comprehensive and shall cover at least the following areas:</p> <ul style="list-style-type: none"> a. Applicability of the C2 Level of Trustiness as defined by the NSA b. Applicability of the C2 Object Reuse capability c. Discretionary control and monitoring of user access d. ECS communications, network access, control, and monitoring e. Computer system "virus" monitoring, detection, and remedy f. Data protection controls g. Account/privilege management and user session tailoring h. Restart/recovery i. Security audit trail generation j. Security analysis and reporting k. Risk analysis <p>The EOC must show that the security management policies and procedures at the site includes the ECS technical security policy planing.</p>	
EOSD2200#A	<p>This requirement is verified through inspection .</p> <p>Selection criteria meeting overall ECS security policies and system requirements shall be applied when selecting hardware.</p> <p>The EOC must show that the overall ECS security policies and system requirements are applied when selecting hardware.</p>	
SMC-2605#A	<p>This requirement is verified through demonstration.</p> <p>Partial compliance is performed by the staff using various office automation, CM, and other tools.</p> <p>The LSM shall support the site and element in implementing ESDIS Project policies and procedures received from the SMC covering the following areas, at a minimum:</p> <ul style="list-style-type: none"> a. Element responsibility and authority b. Resource management c. Fault recovery 	

	<div>d. Testing e. Simulation f. Maintenance g. Logistics h. Performance evaluation i. Training j. Quality and product assurance k. Inventory management l. System enhancements m. Finance management n. Administrative actions o. Security</div> <div>The EOC must receive the names for the policies, procedures, and directives for element responsibility and authority, resource management, fault recovery, testing, maintenance, logistics, training, inventory management, system enhancements, administrative actions, and security from the SMC.</div> <div>This test procedure does not verify parts e, h, j, and m.</div>			
SMC-4305#A	<div>This requirement is verified through analysis. Compliance for this requirement is performed by using office automation tools.</div> <div>The LSM shall maintain fault management policies and procedures for its element.</div> <div>The EOC must have the capability to find the policies, procedures, and directives for element responsibility and authority, resource management, fault recovery, testing, maintenance, logistics, training, inventory management, system enhancements, administrative actions, and security. Using the office automation tools, a changed paragraph in the fault management directive must be saved and the changed document stored back into the CM data base.</div>			
SMC-5305#A	<div>This requirement is verified through analysis. In this release only partial compliance is performed using office automation tools.</div> <div>The LSM shall maintain security policies and procedures, including, at a minimum: a. Physical security b. Password management c. Operational security d. Data classifications e. Access/privileges f. Compromise mitigation</div> <div>The EOC must have the capability to find the policies, procedures, and directives for physical security, password management, operational security, data classifications, access/privileges, and compromise mitigation. Using the office automation tools, a changed paragraph in the fault management directive must be saved and the changed document stored back into the CM data base.</div>			
Test Inputs: Hardcopies of the ESDIS project policies and procedures which includes, element authority, resource management, fault recovery, testing, maintenance, logistics, training, inventory management, system enhancements, administrative actions, and security.				
Data Set Name	Data Set ID	File Name	Description	Version

Step-By-Step Procedures		
Step No.	Input Action / Expected Results	Pass / Fail / Comments
10	FOT Spacecraft Activity Controller: Login to the system.	
20	Expected Result: Successful logon.	
30	FOT Spacecraft Activity Controller: Obtain proper ECS authority to update policies.	
40	Expected Result: The Tester has the responsibility and authority to access and update information in policies and procedures, and directives.	
50	FOT Spacecraft Activity Controller: Enter the QA data base directory for read/write.	
60	Expected Result: Entry to the QA system.	
70	FOT Spacecraft Activity Controller: Query the QA data base for on line policies and procedures, and directives.	
80	Expected Result: A listing of the current policies, procedures, and directives is displayed.	
90	FOT Spacecraft Activity Controller: From the listing find the names for the policies, procedures, and directives for performance evaluation, and quality and product assurance.	
100	FOT Spacecraft Activity Controller: Query the policy for performance evaluation and list the policy status.	
110	FOT Spacecraft Activity Controller: Check known status with the computer generated policy status.	
120	Expected Result: The status information compares.	
130	FOT Spacecraft Activity Controller: Using the office automation tools display the performance evaluation policy.	
140	Expected Result: The performance evaluation policy is displayed.	
150	FOT Spacecraft Activity Controller: Using the office automation tools, change a paragraph in the policy and store the document back into the QA data base.	
160	Expected Result: The performance evaluation policy will be updated and flagged for down loading to the SMC to replace the document maintained in the SMC data base.	
170	FOT Spacecraft Activity Controller: Close the QA data base.	
180	FOT Spacecraft Activity Controller: Enter the CM data base directory for read/write.	
190	Expected Result: Entry to the CM system.	
200	FOT Spacecraft Activity Controller: Query the CM data base for on line policies and procedures, and directives.	
210	Expected Result: A listing of the current policies, procedures, and directives is displayed.	

220	FOT Spacecraft Activity Controller: From the listing find the names for the policies, procedures, and directives for element responsibility and authority, resource management, fault recovery, testing, simulation, maintenance, logistics, training, inventory management, system enhancements, finance management, administrative actions, and security	
230	FOT Spacecraft Activity Controller: Query the policy for performance evaluation and list the directive status for training.	
240	FOT Spacecraft Activity Controller: Check known status with the computer generated directive status.	
250	Expected Result: The status information compares.	
260	FOT Spacecraft Activity Controller: Using the office automation tools display the training directive.	
270	Expected Result: The training directive is displayed.	
280	FOT Spacecraft Activity Controller: Using the office automation tools, change a paragraph in the directive and store the document back into the CM data base.	
290	Expected Result: The training directive will be updated and flagged for down loading to the SMC to replace the document maintained in the SMC data base.	
300	FOT Spacecraft Activity Controller: Close the CM data base.	
310	FOT Spacecraft Activity Controller: Demonstrate the capability of the LSM to provide, via the ECS bulletin board service, a toolkit consisting of a list of approved CASE tools and references to standards for exchanging data for science use.	
320	Expected Result: Successful demonstration.	
330	FOT Spacecraft Activity Controller: Log on to the bulletin board server.	
340	Expected Result: Bulletin board service is initialized.	
350	FOT Spacecraft Activity Controller: Scroll down the bulletin board list for information on ECS status, events, and news.	
360	FOT Spacecraft Activity Controller: Open the ECS status bulletin board.	
370	Expected Result: A list of the ECS status messages is displayed.	
380	FOT Spacecraft Activity Controller: Select a message.	
390	Expected Result: The message is displayed.	
400	FOT Spacecraft Activity Controller: Quit.	
410	Expected Result: Exit the bulletin board.	
Data Reduction and Analysis Steps: To assure that complete security policies and procedures applicable to EOC are in-place, the following is done: A. Written site policies and procedures are available. B. Inspect the security documentation for applicability to the EOC. The inspection also verifies that EOC security documentation is maintained to include latest security directives		
Signature:		Date:

8.4.8 Network Management Sequence

This sequence confirms the ECS ability to support, control and maintain ECS network management information such as network configuration management, network fault management, network performance management, network security management at the EOC. EOC network configuration management functions are inspected.

Configuration: The system configuration needed to perform this sequence of tests are as follows: Real-Time Server, Data Server, Multicast Server, CSS Server, MSS Server, FOT Workstation, IOT Workstation, MSS Workstation, and ISS equipment. Refer to Table 7-2 and Table 7-3 for additional detail.

External Interfaces: There are no external interfaces needed for this sequence.

Operator Position(s): The operator position from the ECS Maintenance and Operations Position Descriptions document (607/OP2) needed to support this sequence is listed:

FOT Spacecraft Activity Controller

Operational Scenario(s): There are no operations scenarios, taken from the Operations Scenarios for the ECS Project: Release-A (605/OP1), used during this sequence of tests.

Test Dependencies: . There are no test dependencies needed for this sequence of tests.

8.4.8.1 Network Configuration and Status

TEST Procedure No.: A080490.010\$F	Date Executed:	Test Conductor:
Title: Network Configuration and Status		
Objective: The Network Status Test confirms the ability of the EOC LSM staff to obtain configuration management information and the status of network resources, including data flow status information. Services provided by ECS include collecting information describing the state of the network subsystem and its communications resources. This test also verifies the ability to perform management functions which exercise control over the network configuration, parameters, and resources. These functions include access to and manipulation of network resources.		
Requirements	Acceptance Criteria	
EOSD0780#A	This requirement is verified through demonstration. Each element shall be capable of being monitored during testing. The Tester must obtain system status using HP OpenView.	
ESN-0620#A	This requirement is verified through test. The ESN shall include a network management function to monitor and control the ESN. The Tester must verify that HP OpenView provides the ability to monitor and control the network.	
ESN-0640#A	This requirement is verified through test. The ESN shall include management functions at each ECS element, equipment or gateway within the ESN. The MSS Discovery Service must discover (via network protocol) new instances of managed objects, detect missing occurrences of managed objects, and report missing occurrences of managed objects.	
ESN-0650#A	This requirement is verified through test. The ESN shall perform the following network management functions for each protocol stack implemented in any ECS element, and each communications facility: a. Network Configuration Management b. Network Fault Management c. Network Performance Management d. Network Security Management The Tester must utilize HP OpenView to obtain information on the system configuration and changes in the system configuration. This test procedure does NOT verify parts b, c and d of the requirement.	
ESN-0690#A	This requirement is verified through test. The ESN shall be capable of reconfiguration transparent to network users. Needs further investigation. On ESDIS List.	
ESN-0780#A	This requirement is verified through test. The network elements including the Internet interfaces, shall have the capability to report, periodically and on an interactive basis, network statistics to the ESN network management function, including the following information: a. Network round trip delay	

	<p>b. Network reset and restart indications c. Outages and CRC errors d. Performance statistics</p> <p>The ISS physical components, and services must have the capability to be monitored via SNMP agents.</p> <p>This test procedure does NOT verify part d of this requirement.</p>
ESN-0790#A	<p>This requirement is verified through test.</p> <p>The ESN shall include the following configuration management functions at a minimum:</p> <ol style="list-style-type: none"> collect information describing the state of the network subsystem and its communications resources, exercise control over the configuration, parameters, and resources of the subsystem, and over the information collected, store the configuration information collected, and display the configuration information <p>The MSS Maps/Collection Service must retain the status of managed objects and their relationship to symbols that comprise a graphical representation of the physical network topology. The MSS Fault Management Application Service must provide the capability to create, modify, delete and display graphical representations of a given network topology.</p>
ESN-0800#A	<p>This requirement is verified through test.</p> <p>The ESN shall be capable of displaying the local network configuration status related to each system locally, and for all systems at the ESN network management facility.</p> <p>The MSS must be capable of displaying the local network configuration status related to each system locally, and for all systems at the network management facility.</p>
ESN-1030#A	<p>This requirement is verified through demonstration.</p> <p>The ESN shall perform periodic testing of alternate communication capabilities to verify that they are operational.</p> <p>The Tester must demonstrate multiple tests of the communications system.</p>
ESN-1060#A	<p>This requirement is verified through test.</p> <p>The ESN performance management function shall provide the capability to evaluate the performance of ESN resources and interconnection activities.</p> <p>The MSS performance management application service must be capable of receiving operational state change notifications from network components, hosts, applications, and peripherals.</p>
ESN-1070#A	<p>This requirement is verified through test.</p> <p>The ESN shall provide the capability to perform the following functions, at a minimum:</p> <ol style="list-style-type: none"> generate/collect network statistics control collection/generation of network statistics store system statistics and statistical histories display the system statistics track end-to-end transaction performance. <p>The Tester must generate, control, display and store system and network statistics.</p> <p>This test does NOT verify part e of this requirement.</p>
ESN-1140#A	<p>This requirement is verified through test.</p> <p>The ESN shall provide protocol translation, termination, bridging and routing.</p>

	The Tester performs IP, UDP, and SNMP protocol tests demonstration the ability to translate between multiple protocols. The Tester identifies bridges and routers using HP OpenView's configuration topology map.
ESN-1330#A	<p>This requirement is verified through test.</p> <p>The ESN shall provide ISO/OSI data communications protocols and services specified in the GOSIP (see Figure 8-3) to external interfaces as required by the IRDs.</p> <p>The CSS must support the TCP and UDP communication protocols to communicate between the servers and the clients.</p> <p>The GOSIP services are not required in Release A.</p>
ESN-1340#A	<p>This requirement is verified through test.</p> <p>The ESN shall provide support for TCP/IP communications protocols and services to external interfaces as required by the IRDs.</p> <p>The MSS must support TCP/IP communications protocols and services to external interfaces as required by the IRDs.</p> <p>The GOSIP services are not required in Release A.</p>
NSI-0020#A	<p>This requirement is verified through test.</p> <p>NSI shall provide support for TCP/IP communication protocols and services to ESN.</p> <p>The NSI must support TCP/IP communications protocols and services to EOC as required by the IRDs.</p>

Step-By-Step Procedures		
Step No.	Input Action / Expected Results	Pass / Fail / Comments
10	FOT Spacecraft Activity Controller: Log on to EOC MSS Server as an administrator and execute the HP OpenView application.	
20	Expected Results: HP OpenView window is displayed on the screen. The HP OpenView window displays a map depicting the EOC configuration.	
30	FOT Spacecraft Activity Controller: Identify routers and gateways depicted in the map.	
35	Expected Results: The routers and gateways are displayed in the map.	
40	FOT Spacecraft Activity Controller: Initialize an application being monitored by HP OpenView.	
50	Expected Result: The application is initialized.	
60	FOT Spacecraft Activity Controller: Verify that the system recognizes the monitoring of the application.	
70	Expected Result: The system recognizes the monitoring of the application.	
80	FOT Spacecraft Activity Controller: Exit from the application and verify that the system depicts the change.	
90	Expected Result: The change is depicted by the system.	
100	FOT Spacecraft Activity Controller: Make HP OpenView's window active by clicking on it.	
110	Expected Result: HP OpenView's window is active.	
120	FOT Spacecraft Activity Controller: Perform an IP protocol test.	
130	Expected Result: HP OpenView verifies the use of IP protocol communications.	
140	FOT Spacecraft Activity Controller: Perform a TCP protocol test.	
160	Expected Result: HP OpenView verifies the use of TCP protocol communications.	
170	FOT Spacecraft Activity Controller: Perform an UDP protocol test.	
180	Expected Result: HP OpenView verifies the use of UDP protocol communications.	
190	FOT Spacecraft Activity Controller: Perform an SNMP protocol test.	
200	Expected Result: HP OpenView verifies the use of SNMP protocol communications.	
210	FOT Spacecraft Activity Controller: Connect a hardware device to the network (e.g. a printer). Verify that the system recognizes the new configuration.	
220	Expected Result: The topology map displayed by HP OpenView depicts the new configuration.	

230	FOT Spacecraft Activity Controller: Turn off the power to the hardware device. Verify that the system recognized the new configuration.	
240	Expected Result: The topology map displayed by HP OpenView depicts the new configuration.	
250	FOT Spacecraft Activity Controller: Turn the power back on for the hardware device. Verify that the system recognized the new configuration.	
260	Expected Result: The topology map displayed by HP OpenView depicts the new configuration.	
270	FOT Spacecraft Activity Controller: Disconnect the hardware device from the network. Verify that the system recognizes the new configuration.	
280	Expected Result: The topology map displayed by HP OpenView depicts the new configuration.	
290	FOT Spacecraft Activity Controller: Change to the directory which contains the history log.	
300	FOT Spacecraft Activity Controller: Examine the history log to determine whether the events have been documented.	
310	Expected Results: The events have been documented in the history log.	
Data Reduction and Analysis Steps:		
Signature:		Date:

8.4.8.2 Directory Service

TEST Procedure No.: A080490.050\$F	Date Executed:	Test Conductor:
Title: Directory Service		
Objective: The purpose of this test is to investigate the functionality of the Directory/Naming Service. The Directory/Naming Service uniquely associates a name with resources/principals, either physical or logical, along with some information so they can be identified and located by the name even if the named resource changes its physical address over time.		
Requirements	Acceptance Criteria	
ESN-0010#A	<p>This requirement is verified through test.</p> <p>ESN shall provide the following standard services:</p> <ul style="list-style-type: none"> a. Data Transfer and Management Services b. Electronic Messaging Service c. Remote Terminal Service d. Process to Process Communication Service e. Directory and User Access Control Service f. Network Management Service g. Network Security and Access Control Service h. Internetwork Interface Services i. Bulletin Board Service <p>The Tester verifies the directory and user access control service by defining an attribute using the Directory/Naming Service.</p> <p>This test does NOT verify parts a, b, c, d, f, g, h, and i of the requirement.</p>	
ESN-0490#A	<p>This requirement is verified through test.</p> <p>The ESN shall provide a name-to-attribute mapping Directory Service.</p> <p>The Tester verifies the name-to-attribute mapping by defining an attribute using the Directory/Naming Service.</p>	
ESN-0510#A	<p>This requirement is verified through test.</p> <p>The directory function shall be able to respond to requests for information concerning named objects, either physical or logical, so as to support communications with those objects.</p> <p>The Tester verifies the directory function by modifying an attribute definition using the Directory/Naming Service.</p>	
ESN-0590#A	<p>This requirement is verified through test.</p> <p>The ESN Directory Service shall be protected by access control capabilities.</p> <p>The CSS Security service must provide an API to verify the identity of users.</p>	
ESN-0600#A	<p>This requirement is verified through test.</p> <p>The ESN Directory service shall include services and supporting mechanisms to authenticate the credentials of a user for the purpose of granting access rights and authorizing requested operations.</p> <p>The CSS Security service must provide an API to check the authorization privileges of principals to access/control services/resources.</p>	

ESN-0610#A		<p>This requirement is verified through test.</p> <p>The ESN shall include multiple Directory Service Agents (DSAs) which are collectively responsible for holding or retrieving all directory information which is needed by ECS.</p> <p>The Tester verifies the directory and user access control service by defining an attribute using the Directory/Naming Service.</p>		
Test Inputs:				
Data Set Name	Data Set ID	File Name	Description	Version
ATTR_001			List of defined attributes	

Step-By-Step Procedures		
Step No.	Input Action / Expected Results	Pass / Fail / Comments
10	FOT Spacecraft Activity Controller: Login to FOT Workstation	
20	Expected Results: FUI display appears on the screen.	
30	FOT Spacecraft Activity Controller: Perform DCE login using a DCE account and password.	
40	Expected Result: The Computer Operator gains access to the DCE account.	
50	FOT Spacecraft Activity Controller: Type cdsbrowser & to verify the directory naming activity.	
60	Expected Result: The directory naming activity is verified.	
70	FOT Spacecraft Activity Controller: From the cdsbrowser, select an attribute and press Display .	
80	Expected Result: The system is displays the attributes currently entered into the system.	
90	FOT Spacecraft Activity Controller: Select Attribute and press Display .	
100	Expected Results: A list of available attributes is displayed on the screen.	
110	FOT Spacecraft Activity Controller: Select the attribute MSSAttr to read the attribute values.	
120	Expected Results: The MSSAttr attribute values are displayed on the screen.	
130	FOT Spacecraft Activity Controller: Verify a list of attribute types.	
140	Expected Results: Each of the attributes is contained in the list.	
150	FOT Spacecraft Activity Controller: Select Modify an Attribute .	
160	Expected Results: Access to modify an attribute is available.	
170	FOT Spacecraft Activity Controller: Change the MSSAttr attribute to CSSAttr .	
180	Expected Results: The name of the MSSAttr attribute is changed to CSSAttr .	
Data Reduction and Analysis Steps:		
Signature:		Date:

8.5 Performance Management Scenario

This scenario walks GSFC operations personnel through the process of accessing and displaying system performance parameters and metrics. It carries the staff through a series of analytical and diagnostic sequences which demonstrate the system's capability to measure GSFC performance and detect operational trends.

The Performance Management Scenario's acceptance testing activity confirms those functions that provide global integrated ECS performance management services and exercise system-wide control. Verifying ECS metrics confirms ECS capability for defining meaningful measures, for developing and maintaining standard performance metrics, and for accomplishing system-level performance testing and performance improvement actions.

8.5.1 Metrics Sequence

This test sequence verifies the capability of the GSFC LSM to interact with the SMC to evaluate system performance for a broad spectrum of activities including data collection and delivery, product generation, responses to user requests, and emergencies. LSM capabilities, including the ability to implement SMC performance criteria and limits testing, using SMC data base metrics for comparison, are confirmed. The SMC and the LSM capabilities to generate alert indicators for fault and degraded conditions are also confirmed.

Finally, the capability of the GSFC DAAC to provide the required availability of key services and to switch over or repair failed capabilities within specified mean down times (MDTs) is confirmed.

Configuration: The system configuration needed to perform this sequence of tests are as follows: Real-Time Server, Data Server, Multicast Server, CSS Server, MSS Server, FOT Workstation, IOT Workstation, MSS Workstation, and ISS equipment. Refer to Table 7-2 and Table 7-3 for additional detail.

External Interfaces: There are no external Interfaces needed for this sequence.

Operator Position(s): The operator positions from the ECS Maintenance and Operations Position Descriptions document (607/OP2) needed to support this sequence are listed:

EOC Spacecraft Activity Controller

Operational Scenario(s): The operations scenarios, taken from the Operations Scenarios for the ECS Project: Release-A document (605/OP1), that were used to develop tests in this sequence of tests are listed:

Operation Support Scenario (Section 3.5.1)

Test Dependencies: There are no test dependencies for this sequence.

8.5.1.3 RMA Assurance Test and Analysis

TEST Procedure No.: A080510.030\$F		Date Executed:		Test Conductor:	
Title: RMA Assurance Test and Analysis					
Objective: This test case verifies that the ECS collects and monitors reliability statistics provide services with required reliability, maintainability and availability (RMA).					
Requirements		Acceptance Criteria			
EOSD3490#A		This requirement is verified through inspection. (RTM: demo) Reliability statistics for ECS shall be collected and monitored using the Mean Time Between Maintenance (MTBM) for each component and operational capability. This capability is demonstrated by inspection of the MTBM Predictions used in, and analysis results documented in the DID #515.			
EOSD4100#A		This requirement is verified through test. (RTM: Demo) The ECS segments, elements, and components shall include the on-line (operational mode) and off-line (test mode) fault detection and isolation capabilities required to achieve the specified operational availability requirements. This capability is confirmed by inspection of the Maintainability Demonstration Plan (DID 511) and Maintainability Demonstration Test Plans (DID 512) and analysis of the Maintainability Demonstration Test Reports (DID 519). Although these test plans and reports might not apply to the EOC, the inspection and analysis conducted for other ECS sites, such as the GSFC DAAC, also apply to the EOC, since the generic fault management service, rather than site-specific hardware or configuration, is the item under test.			
Test Inputs: Maintainability Demonstration Plan (DID 511) Maintainability Demonstration Test Plans (DID 512) Availability Models/Predictions (DID 515) Maintainability Demonstration Test Reports (DID 519)					
Data Set Name	Data Set ID	File Name	Description	Version	

Step-By-Step Procedures		
Step No.	Input Action / Expected Results	Pass / Fail / Comments
10	Tester: Inspects DID #515 to verify requirement EOSD3490#A.	
20	Expected Result: The expected result is confirmation of the MTBM Predictions used in, and analysis results documented in, DID #515.	
30	FOT Spacecraft Activity Controller: Examines the test executed in Maintainability Demo Test and Test Plans, (DID 511 and DID 512, respectively) to verify that the ECS system includes the on-line (operational mode) and off-line (test mode) fault detection and isolation capabilities required to achieve the specified operational availability.	
40	<p>Expected Result: DID 519 (Test Report) states that the result of the test stated in DID 511 and DID 512 indicating the ECS system includes the on-line (operational mode) and off-line (test mode) fault detection and isolation capabilities required to achieve the specified operational availability.</p> <p>Note: To the extent that the results of the Maintainability Demonstration Test for requirement EOSD4100#A passes at the EOC (or any other ECS site) this requirement also is satisfied at the EOC, since the generic fault management service, rather than site-specific hardware or configuration, is the item under test.</p>	
Data Reduction and Analysis Steps: Expected results include inspecting the related Maintainability Demo Test documents to confirm that the ECS can make needed services available as required.		
Signature:		Date:

8.5.2 Performance Monitoring, Analysis & Testing Sequence

This sequence does not apply to the EOC Volume of the Acceptance Test Procedures document for Release A.

8.6 Ancillary Services Scenario

This scenario verifies certain system fault detection and isolation instances, security monitoring episodes, and accounting and report generation sequences. With respect to fault management, the capability for performing site-level fault analysis, fault diagnostic testing and recovery actions is evaluated. Evaluation of ECS accountability activities extends to LSM in-site functions including related data collection, analysis and reporting activities is assessed. Evaluation of ECS report generation capabilities extends to evaluating the capability for providing required reports specified by all of the services referenced in the system management scenario group.

8.6.1 Fault Management Sequence

Configuration: The system configuration needed to perform this sequence of tests are as follows: Real-Time Server, Data Server, Multicast Server, CSS Server, MSS Server, FOT Workstation, IOT Workstation, MSS Workstation, and ISS equipment. Refer to Table 7-2 and Table 7-3 for additional detail.

External Interfaces: The external interfaces (i.e. other ECS sites and data sources) needed for this sequence (both real and simulated) are listed:

SMC

GSFC DAAC

Operator Position(s): The operator positions from the ECS Maintenance and Operations Position Descriptions document (607/OP2) needed to support this sequence are listed:

FOT Database Manager

FOT Spacecraft Activity Controller

Operational Scenario: There are no operations scenarios, taken from the Operations Scenarios for the ECS Project: Release-A (605/OP1) used during this sequence of tests.

Test Dependencies: There are no test dependencies needed for this sequence of tests.

8.6.1.1 Data Archive and Distribution Fault Analysis and Diagnostic Testing

TEST Procedure No.: A080610.020\$F	Date Executed:	Test Conductor:
Title:	Data Archive and Distribution Fault Analysis and Diagnostic Testing	
Objective:	This test verifies the fault management requirements for the EOC file server. Simulated faults are induced in the subsystem to verify fault detection, fault isolation and reporting.	
Requirements	Acceptance Criteria	
SMC-4315#A	This requirement is verified through test. The LSM shall, at a minimum, isolate, locate, and identify faults, identify subsystem, equipment, and software faults, and identify the nature of the faults within its element. The MSS must be able to accurately depict the operational status of all ECS elements and update this status following a simulated storage media fault.	
SMC-4325#A	This requirement is verified through demonstration. The LSM shall request fault diagnosis testing be performed, including, at a minimum: a. Software and hardware tolerance testing b. Resource-to-resource connectivity testing within its element The MSS Fault Management Application Service must correctly fault isolate a storage media fault.	
SMC-4335#A	This requirement is verified through test. The LSM shall generate fault recovery commands, directives, and instructions within its element. The MSS Fault Management Application Service must provide instructions for returning the failing resources to service.	

Step-By-Step Procedures		
Step No.	Input Action / Expected Results	Pass / Fail / Comments
Storage Media Fault Test		
10	FOT Database Manager: Login to the EOC MSS server workstation using a valid ID and password as an administrator.	
20	FOT Database Manager: Initialize HP OpenView using the <ovw &> command.	
30	Expected Result: A map depicting the overall topology is displayed.	
40	FOT Database Manager: Double click on the 'EOC' icon to bring up the EOC window.	
50	Select 'Options' from the menu bar, followed by 'Topology/Status Polling : IP...'	
60	Expected Result: A map depicting the site configuration is accurately displayed. All icon symbols are on-line, displayed in green.	
70	FOT Database Manager: Simulate a device failure by taking the File Server RAID storage device off-line.	
80	Expected Results: The icon for the RAID storage device is red and the EOC icon is yellow.	
90	FOT Database Manager: Double click on Diagnose, Network Activity, Demand Poll .	
100	Expected Result: Hardware polling is initiated.	
110	FOT Database Manager: Double click on the red RAID storage device icon.	
120	Expected Results: Node submap opens with RAID storage interface red.	
130	FOT Database Manager: Place the File Server RAID storage device back on-line.	
140	Expected Result: Submap icons are green.	
150	FOT Database Manager: Open the Event Categories window.	
160	FOT Database Manager: Select Error Events from the list of event categories.	
170	Expected Results: The Event Browser window displays a list of error events.	
180	Verify the Event Browser displays the proper information in accordance with the Data Reduction and Analysis Steps A through C.	
190	Operations Supervisor: Login to the MSS server workstation using a valid ID and password as an administrator.	
200	Operations Supervisor: Initialize HP OpenView using the <ovw &> command.	

210	Operations Supervisor: A map depicting the overall topology is displayed.	
220	Operations Supervisor: Double click on the 'EOC' icon to bring up the EOC window.	
230	Operations Supervisor: Open the Event Categories window	
240	Operations Supervisor: Select Error Events from the list of event categories.	
250	Expected Results: The Event Browser window displays a list of error events.	
260	Verify the Event Browser displays the proper information in accordance with the Data Reduction and Analysis Steps A through C.	
270	Exit HP OpenView	
Data Reduction and Analysis Steps: A. The following materials should be secured for analysis: 1. Error Event Log Printout. B. Search the list of error events to find the File Server RAID storage device failure produced by this test. C. Verify that the Event Browser provides the following information: 1. Severity is critical 2. Date/Time of the fault are correct 3. Source identifies the File Server RAID storage device 4. An appropriate message identifies the fault D. The following materials should be secured for analysis: 1. Error Event Log Printout. E. Search the list of error events to find the File Server RAID storage device failure produced by this test. F. Verify that the Event Browser provides the following information: 1. Severity is critical 2. Date/Time of the fault are correct 3. Source identifies a science data processing fault 4. An appropriate message identifies the fault		
Signature:		Date:

8.6.1.3 Communications Fault Analysis and Diagnostics Testing

TEST Procedure No.: A080610.050\$F	Date Executed:	Test Conductor:
Title: Communications Fault Analysis and Diagnostic Testing		
Objective: This test verifies the fault management requirements for the communications subsystem of the ECS. Simulated faults are induced in the subsystem to verify fault detection, fault isolation and reporting.		
Requirements	Acceptance Criteria	
ESN-0650#A	<p>This requirement is verified through test.</p> <p>The ESN shall perform the following network management functions for each protocol stack implemented in any ECS element, and each communications facility:</p> <ul style="list-style-type: none"> a. Network Configuration Management b. Network Fault Management c. Network Performance Management d. Network Security Management <p>A CSS fault induced by interrupting a network connection must be properly managed such that the fault is detected, system operators are notified about the fault, and the fault is logged and forwarded to the SMC.</p> <p>This test procedure does not verify items a, c and d of this requirement.</p>	
ESN-0740#A	<p>This requirement is verified by test.</p> <p>The ESN network management service shall retrieve performance/fault data about ESN protocol stacks and equipment.</p> <p>A CSS fault induced by interrupting a network connection must be detected and information provided that accurately identifies the fault. Performance data is not tested in this test case.</p>	
ESN-0810#A	<p>This requirement is verified through test.</p> <p>ESN shall provide the following fault management functions at a minimum:</p> <ul style="list-style-type: none"> a. detect the occurrence of faults, b. control the collection of fault information, and c. diagnose the probable cause of a detected fault <p>A CSS fault induced by interrupting a network connection must be detected, accurately diagnosed, and logged.</p>	
ESN-0815#A	<p>This requirement is verified through test.</p> <p>Network simulation and traffic modeling capability shall be provided to troubleshoot network problems and to use in network planning.</p> <p>The Tester uses network simulation to solve the network fault.</p>	
ESN-0830#A	<p>This requirement is verified through test.</p> <p>The ESN shall have the capability to detect and report communications related errors and events both locally and at the ESN network management facility.</p> <p>An ISS fault induced by interrupting a network connection must be detected, accurately diagnosed, logged and reported locally and at the SMC.</p>	

ESN-0840#A	<p>This requirement is verified through test.</p> <p>The ESN shall have error reporting, event logging and generation of alerts.</p> <p>A CSS fault induced by interrupting a network connection must be reported and logged in the event log file and alerts generated.</p>
ESN-0900#A	<p>This requirement is verified through test.</p> <p>Errors and events to be detected shall include at least:</p> <ul style="list-style-type: none"> a. communications software version or configuration errors b. communications hardware errors c. protocol errors d. performance degradation conditions e. telecommunications errors and failures <p>CSS faults induced by interrupting a telecommunication connection, network connection, or configuration error must be reported and logged in the event log file and alerts generated.</p> <p>This test procedure does not verify item d of this requirement</p>
ESN-0910#A	<p>This requirement is verified through test.</p> <p>The ESN fault management shall provide the capability to perform the following functions, at a minimum, both locally and at the ESN network management facility:</p> <ul style="list-style-type: none"> a. set, view, and change alert threshold values b. enable and disable alert notifications (alarms) within a system c. enable and disable event reports within a system d. manage error and event logging files <p>The MSS Monitor/Control Service will be used to set fault thresholds, enable/disable alarms and reports caused by CSS faults and schedule the transfer of fault management data to the SMC.</p>
ESN-0920#A	<p>This requirement is verified through inspection.</p> <p>The ESN shall provide a set of utilities to perform diagnostic and testing functions for purposes of fault isolation.</p> <p>The MSS Fault Management Application Service will provide utilities to perform diagnostics and testing of connectivity between ECS hosts and router, the ability to reach hosts and routers, and the availability of network services at hosts.</p>
ESN-1000#A	<p>This requirement is verified through demonstration.</p> <p>The ESN network management function shall have the capability to build histories for different types of errors and events, and the capability to analyze errors and recommend corrective action wherever practical.</p> <p>The MSS Fault Management Application Service will demonstrate the ability to build histories for different types of errors and events detected, for the purpose of analysis.</p>
ESN-1010#A	<p>This requirement is verified through test.</p> <p>The ESN shall provide, for selective use as a debugging aid, the capability to perform packet tracing of its supported protocols.</p> <p>This requirement is verified during Integration and Test and is not verified during this test.</p>

Step-By-Step Procedures		
Step No.	Input Action / Expected Results	Pass / Fail / Comments
Communications Hardware Fault		
10	FOT Spacecraft Activity Controller: Logon the MSS server workstation.	
20	FOT Spacecraft Activity Controller: Initialize HP OpenView using the <ovw &> command.	
30	Expected Results: A map depicting the overall topology is displayed.	
40	FOT Spacecraft Activity Controller: Double click on the EOC icon.	
50	Expected Results: A map depicting the EOC configuration is accurately displayed with all symbols displayed in green.	
60	FOT Spacecraft Activity Controller: Prepare to send an E-Mail message of considerable length (20 pages or more) to the GSFC DAAC.	
70	Tester: Instruct the FOT Spacecraft Activity Controller to send the E-Mail message, wait approximately 2 seconds then remove power from the FDDI concentrator.	
80	Expected Results: a. The FDDI Concentrator symbol is red b. Audible alarm sounds c. The fault is logged in the error log file d. The fault is forwarded to the SMC	
90	FOT Spacecraft Activity Controller: Double click on the red FDDI concentrator symbol.	
100	Expected Results: Information accurately describing the fault is displayed.	
110	FOT Spacecraft Activity Controller: Close the window for the FDDI concentrator	
120	Tester: Restore power to the FDDI concentrator.	
130	Expected Results: The FDDI concentrator symbol is green.	
140	FOT Spacecraft Activity Controller: Verify the fault is accurately logged and described in the error log file.	
Network Communications Fault		
150	Tester: Disconnect the LAN cable from the ingest server.	
160	Expected Results: a. The ingest server symbol is red b. Audible alarm sounds c. The fault is logged in the error log file d. The fault is forwarded to the SMC	
170	FOT Spacecraft Activity Controller: Double click on the red ingest server symbol.	

180	Expected Results: Information accurately describing the fault is displayed.	
190	FOT Spacecraft Activity Controller: Close the window for the ingest server.	
200	Tester: Restore the ingest server LAN connection.	
210	Expected Results: The ingest server symbol is green.	
220	FOT Spacecraft Activity Controller: Verify the fault is accurately logged and described in the error log file.	
Communication Configuration Fault		
230	Tester: Change the IP address of one data management server.	
240	Expected Results: a. The data management server symbol is red b. Audible alarm sounds c. The fault is logged in the error log file d. The fault is forwarded to the SMC	
250	FOT Spacecraft Activity Controller: Double click on the red data management server symbol.	
260	Expected Results: Information accurately describing the fault is displayed.	
270	FOT Spacecraft Activity Controller: Close the window for the data management server.	
280	Tester: Restore the data management server IP address.	
290	Expected Results: The data management server symbol is green.	
300	FOT Spacecraft Activity Controller: Verify the fault is accurately logged and described in the error log file.	
Histories		
310	FOT Spacecraft Activity Controller: Initiate the MSS Fault Management Application Service.	
320	Expected Result: The MSS Fault Management Application Service appears on the screen.	
330	FOT Spacecraft Activity Controller: Using the MSS Fault Management Application Service, build a history for all communications faults for today's date.	
340	Expected Results: The MSS Fault Management Application Service displays a history of all communications faults produced by this test.	
Fault Management		
350	FOT Spacecraft Activity Controller: Initiate the MSS Monitor/Control Service.	
360	Expected Result: The MSS Monitor/Control Service application appears on the screen.	
370	FOT Spacecraft Activity Controller: Change threshold values managed resources.	
380	Expected Result: The MSS Monitor/Control Service accepts valid threshold value changes.	

390	FOT Spacecraft Activity Controller: Change the enable/disable alert status of managed resources.	
400	Expected Result: The MSS Monitor/Control Service accepts changes to the enable/disable alert status of managed resources.	
410	FOT Spacecraft Activity Controller: Exit the MSS Monitor/Control Service.	
420	FOT Spacecraft Activity Controller: Initiate the MSS Fault Management Application Service.	
430	Expected Result: The MSS Fault Management Application Service appears on the screen.	
440	FOT Spacecraft Activity Controller: Configure the application to display all fault categories.	
450	Expected Result: A list of all managed resources is displayed.	
460	FOT Spacecraft Activity Controller: Change the enable/disable fault notification status of at least two managed resources.	
470	Expected Result: The MSS Fault Management Application Service accepts the changes.	
Data Reduction and Analysis Steps:		
Signature:		Date:

8.6.2 Security Management Sequence

This sequence provides the guidance in verifying the LSM's capabilities for establishing and maintaining security management data bases and for site-level security activities. This sequence verifies the LSM site-level abilities related to physical security password management, operational security, data security, privileges, and security compromise mitigation. The presence of system-level services for access control, authentication of user credentials is confirmed. Countermeasures for security threats such as unauthorized modification of data, disclosure of authentication information, denial of authorized service, and impersonation of authentication information, is also confirmed. Authentication, access control, data integrity, and data confidentiality protection functions are confirmed and evaluated against system and site requirements. Event functions (detection, reporting, and logging) are demonstrated and confirmed by comparison with system and site requirements.

Configuration: The system configuration needed to perform this sequence of tests are as follows: Real-Time Server, Data Server, Multicast Server, CSS Server, MSS Server, FOT Workstation, IOT Workstation, MSS Workstation, and ISS equipment. Refer to Table 7-2 and Table 7-3 for additional detail.

External Interfaces: The external interface (i.e. other ECS sites and data sources) needed for this sequence (both real and simulated) is listed:

SMC

Operator Position(s): The operator positions from the ECS Maintenance and Operations Position Descriptions document (607/OP2) needed to support this sequence are listed:

FOT Database Manager

Operational Scenario(s): The operations scenario, taken from the Operations Scenarios for the ECS Project: Release-A document (605/OP1), that was used to develop tests in this sequence of tests are listed:

Security Management Login Failure Scenario (Section 3.6.1)

Test Dependencies: There are no test dependencies needed for this sequence of tests.

8.6.2.2 LSM Security Functions

TEST Procedure No.: A080620.040\$F	Date Executed:	Test Conductor:
Title: LSM Security Functions		
Objective: The objective of this test is to verify the LSM security functions; such as maintaining, authenticating, and monitoring user and device accesses and privileges; performing security testing that includes, password auditing and site internal access/privileges checking; performing compromise detection; and performing risk detection and analyses.		
Requirements	Acceptance Criteria	
EOSD2400#A	<p>This requirement is verified through test.</p> <p>ECS shall provide multiple categories of data protection based on the sensitivity levels of ECS data, as defined in NHB 2410.9.</p> <p>The system must control access to archived data to prevent unauthorized access. The system must authenticate that the interactive user is authorized.</p>	
EOSD2510#A	<p>This requirement is verified through demonstration.</p> <p>ECS elements shall maintain an audit trail of:</p> <ul style="list-style-type: none"> a. All accesses to the element security controlled data b. Users/processes/elements requesting access to element security controlled data c. Data access/manipulation operations performed on security controlled data d. Date and time of access to security controlled data e. Unsuccessful access attempt to the element security controlled data by unauthorized users/elements/processes f. Detected computer system viruses and worms g. Actions taken to contain or destroy a virus <p>The CSS Security service must provide the capability to log audit information into security logs whenever authentication and authorization services are used. The audit information must contain the following:</p> <ul style="list-style-type: none"> a. Date and time of the event b. User name c. Type of event d. Success or failure of the event e. Origin of the request. 	
EOSD2550#A	<p>This requirement is verified through test.</p> <p>The ECS elements shall limit use of master passwords or use of a single password for large organizations requiring access to a mix of security controlled and non-sensitive data.</p> <p>The System must require a unique user identification and password for each individual user.</p>	
EOSD2710#A	<p>This requirement is verified through demonstration.</p> <p>ECS elements shall report all detected computer viruses and actions taken to the SMC.</p> <p>The System must provide virus detection services. The LSM must report detected computer viruses to the SMC.</p>	

ESN-0010#A	<p>This requirement is verified through test.</p> <p>ESN shall provide the following standard services:</p> <ul style="list-style-type: none"> a. Data Transfer and Management Services b. Electronic Messaging Service c. Remote Terminal Service d. Process to Process Communication Service e. Directory and User Access Control Service f. Network Management Service g. Network Security and Access Control Service h. Internetwork Interface Services i. Bulletin Board Service <p>The Tester must verify the various LSM security functions.</p> <p>This test does NOT verify parts a, b, c, d, e, f, h, and i of the requirement.</p>
ESN-0650#A	<p>This requirement is verified through test.</p> <p>The ESN shall perform the following network management functions for each protocol stack implemented in any ECS element, and each communications facility:</p> <ul style="list-style-type: none"> a. Network Configuration Management b. Network Fault Management c. Network Performance Management d. Network Security Management <p>The CSS Security service must provide the capability to create/modify/delete user accounts and privileges in the security registry.</p> <p>The CSS Security service must provide the capability to define/modify/delete group information in the security registry.</p> <p>This test procedure does NOT verify parts a, b and c of this requirement.</p>
ESN-1360#A	<p>This requirement is verified through test.</p> <p>The ESN shall control access of processes and users through an authentication and authorization service that meets GNMP standards.</p> <p>The authentication and authorization service must meet GNMP standards.</p>
ESN-1380#A	<p>This requirement is verified through test.</p> <p>The ESN shall provide countermeasures for the following security threats related to data communications:</p> <ul style="list-style-type: none"> a. modification of data (i.e., manipulation) while in transit over the network b. disclosure of authentication information c. degradation in network or processing resource performance through denial of service attack d. Impersonation of authentication credentials or authorization privileges. <p>The CSS Security service must provide an API to check the authorization privileges of principals to access/control services/resources. The CSS Security service must support the Data Encryption Standard (DES) to encrypt and decrypt data.</p>

ESN-1400#A	<p>This requirement is verified through test.</p> <p>The following security functions and services, at a minimum, shall be provided:</p> <ul style="list-style-type: none"> a. authentication b. access (authorization) control c. data integrity d. data confidentiality. <p>The CSS Security service must provide an API to check the authorization privileges of principals to access/control services/resources. The CSS Security service must support the Data Encryption Standard (DES) to encrypt and decrypt data.</p>
ESN-1430#A	<p>This requirement is verified through test.</p> <p>The ESN shall provide the following security event functions:</p> <ul style="list-style-type: none"> a. Event detection b. Event reporting c. Event logging. <p>CSS Event Logger Service must provide capability to record security event and history data to an application specific log file.</p>
SMC-5335#A	<p>This requirement is verified through test.</p> <p>The LSM shall perform security testing that includes, at a minimum, password auditing and element internal access/privileges checking.</p> <p>The MSS site Security Management Application Service must have the capability to perform the following types of security tests:</p> <ul style="list-style-type: none"> a. password auditing b. file system integrity checking c. auditing of user privileges d. auditing of resource access control information.
SMC-5345#A	<p>This requirement is verified through inspection.</p> <p>The LSM shall perform compromise (e.g., virus or worm penetration) risk analysis, and detection.</p> <p>The System must provide virus detection services.</p>
SMC-5355#A	<p>This requirement is verified through test.</p> <p>The LSM shall isolate the compromised area, detach the compromised input I/O, and the compromised areas output I/O until the compromise has been eliminated.</p> <p>The MSS site Security Management Application Service must, upon the detection of a compromise, isolate the compromised input I/O, and the compromised area's output I/O until the compromise has been eliminated.</p>
SMC-5365#A	<p>This requirement is verified through test.</p> <p>The LSM shall generate recovery actions in response to the detection of compromises.</p> <p>The MSS Security Management Application Service must provide office automation support tools to enable the generation of directives and instructions for recovery from detected security events.</p>
Test Inputs: Authorized/Approved user id and password	

Step-By-Step Procedures		
Step No.	Input Action / Expected Results	Pass / Fail / Comments
10	FOT Database Manager: Verifies the existence of virus detection software.	
20	Expected Results: The virus detection software is installed and operational on the system.	
30	FOT Database Manager: Executes a security administrator logon.	
40	Expected Results: The system displays the security administrator main menu.	
50	FOT Database Manager: Performs create, change and delete commands to the security registry.	
60	Expected Results: User accounts are created, changed and deleted.	
70	FOT Database Manager: Verifies that the user accounts contain username, password, group and user identification code, login directory and command line interpreter.	
80	Expected Results: User accounts reflect create, change and delete commands entered by the FOT Database Manager.	
90	FOT Database Manager: Logs off.	
100	Expected Results: The system displays the logon screen.	
110	FOT Database Manager: Executes logon with user id.	
120	Expected Results: The system displays the main menu.	
130	FOT Database Manager: Performs, create, change and delete commands to the security registry.	
140	Expected Results: The user accounts are created, changed and deleted from the system.	
150	FOT Database Manager: Verify that modifications are reflected in the user accounts.	
100	Expected Results: User accounts reflect create, change and delete commands entered by the FOT Database Manager.	
110	FOT Database Manager: Logs off.	
115	Expected Results: The ECS login screen is displayed on the screen.	
120	FOT Database Manager: Using SATAN and CRACK, attempts to log in by guessing passwords. Repeat multiple times.	
130	Expected Results: The security management service detects the multiple events after the preestablished threshold has been crossed. The service sends notification of security alert to the FOT Database Manager.	
140	FOT Database Manager: Receives multiple security alerts. Begins investigation into cause of alerts by invoking the events browser (log) to retrieve the security events.	

150	Expected Results: Displays the requested events. The information must contain the following: a. Date and time of the event b. User name c. Type of event d. Success or failure of the event e. Origin of the request	
160	FOT Database Manager: Discovers that the login attempts on the multiple hosts originated from the same area.	
170	FOT Database Manager: Contacts the MIS manager at the location of the User (Hacker) who proceeds to have the issue investigated locally.	
180	FOT Database Manager: Modifies the network security authorization databases to deny all incoming accesses from the host in question.	
190	1st Authorized/Approved User: Logs on to ECS using a valid user id and password.	
200	Expected Results: The user is able to log onto the system. The next user screen appears.	
210	Tester: Using a network analyzer, verifies that the password is not readable over the network.	
220	2nd Authorized/Approved User: Attempts to log on to ECS using the same valid user id and password used by the 1st Authorized/Approved User in step 190.	
230	Expected Results: The user is unable to log onto the system. A message indicating the user is already logged on is displayed.	
240	1st Authorized/Approved User: Compromises the data by deleting files.	
250	Expected Result: The system detects the compromise, isolates it, until it can be eliminated.	
260	FOT Database Manager: Discovers that the security violation compromise.	
270	FOT Database Manager: Using the Office Automation tools provided, generates instructions for recovery from the detected security event.	
Data Reduction and Analysis Steps:		
Signature:		Date:

8.6.3 Accounting and Accountability Sequence

This sequence verifies the ECS capability to perform compliant accountability functions. The LSM capability to audit hardware and software resources within the EOC is confirmed.

Configuration: The system configuration needed to perform this sequence of tests are as follows: Real-Time Server, Data Server, Multicast Server, CSS Server, MSS Server, FOT Workstation, IOT Workstation, MSS Workstation, and ISS equipment. Refer to Table 7-2 and Table 7-3 for additional detail.

External Interfaces: The following external interfaces (i.e. other ECS sites and data sources) needed for this sequence (both real and simulated) are listed below.

ECS Client

Operator Positions: The following operator positions are needed to support this sequence.

FOT Spacecraft Activity Controller

Operational Scenario: The following scenarios, taken from the ECS Operations Concept for the ECS Project, Part 2A document, are used during this sequence of tests:

ECS Operations Concept for the ECS Project: Part 2A - ECS Release A, 604-CD-003-002, Accountability Management Scenario, (Security 5a)

External Interfaces: There are no external Interfaces needed for this sequence.

8.6.3.2 LSM Data Tracking

TEST Procedure No.: A080630.030\$F	Date Executed:	Test Conductor:
Title:	LSM Data Tracking	
Objective:	This procedure verifies the ECS's ability to manage user accounts, track production activities, and to manage the configuration of system hardware and software resources.	
Requirements	Acceptance Criteria	
SMC-6345#A	This requirement is verified through demonstration. The LSM shall, as needed, perform configuration accountability to include, at a minimum, the audit of hardware and software resources within its element. The MSS configuration management application service must identify a particular software element whose version varies from the operational baseline.	

Step-By-Step Procedures		
Step No.	Input Action / Expected Results	Pass / Fail / Comments
Configuration Accountability Test		
130	FOT Spacecraft Activity Controller: Using the configuration management application service, view the configuration of controlled resources that comprise the site's operational baseline.	
140	Expected Results: There are no variations from the operational baseline.	
150	Tester: Remove a printer from the site configuration.	
160	Tester: Remove a software application from the site configuration.	
150	Expected results: The configuration management application service identifies the variants from the site operational baseline.	
160	Tester: Re-install the printer in the site configuration.	
170	Tester: Re-install the removed software into the site configuration.	
180	Expected Results: The configuration management application service shows no variations from the site's operational baseline.	
190	FOT Spacecraft Activity Controller: Logoff of the system.	
Data Reduction and Analysis Steps:		
Signature:		Date:

8.6.4 Report Generation Sequence

This sequence guides the evaluator in assessing ECS capability for performing EOC report generation required for Release A. This report generator can produce standard or customized outputs for a full range of inputs, such as a functional allocation report giving the current allocation of ground segment functions; summary configuration status reports; summary training reports; hardware configuration and system software reports; spares and consumables reports; and fault management reports. The report generators at the EOC are evaluated through inspection of output products and comparison of the products against site reporting requirements.

Configuration: The system configuration needed to perform this sequence of tests are as follows: Real-Time Server, Data Server, Multicast Server, CSS Server, MSS Server, FOT Workstation, IOT Workstation, MSS Workstation, and ISS equipment. Refer to Table 7-2 and Table 7-3 for additional detail.

External Interfaces: The external interfaces (i.e. other ECS sites and data sources) needed for this sequence (both real and simulated) are listed:

SMC

Operator Position(s): The operator positions from the ECS Maintenance and Operations Position Descriptions document (607-CD-001-002) needed to support this sequence are listed:

DAAC Operations Supervisor

DAAC Production Monitor

DAAC FOT Spacecraft Activity Controller

Operational Scenario(s): There are no operations scenarios taken from the Operations Scenarios for the ECS Project: Release-A, used during this sequence of tests.

Test Dependencies: The following table identifies the test procedure(s) in a sequence of tests that should be run prior to or concurrently with a sequence or test procedure.

Test Procedure No.	Site/Procedure No.	Comments
A080640.030\$F	A080640.030\$S	prior

8.6.4.2 LSM Report Generator

TEST Procedure No.: A080640.030\$F	Date Executed:	Test Conductor:
Title: LSM Report Generator		
Objective: This test procedure demonstrates the existence and the capabilities of a site-specific report generator residing within the site configuration, and the capability to generate pre-defined reports.		
Requirements	Acceptance Criteria	
SMC-8305#A	<p>This requirement is verified through test.</p> <p>The LSM shall have the same report generator capability as for the SMC, except it shall be limited to generating reports covering only its particular site or its particular element.</p> <p>The Production Monitor-QA tests that the system provides the capability of a site report generator and that input data sets are available for report access.</p>	
SMC-8705#A	<p>This requirement is verified through test.</p> <p>The LSM shall have the capability to generate the same types of reports listed under the SMC report generation service, except that each report covers only its particular site or its particular element.</p> <p>The Tester tests that the system provides the capability and use of a site report generator to produce standard reports.</p>	
SMC-8710#A	<p>This requirement is tested at the SMC and is verified through test.</p> <p>The SMC shall have the capability to generate summary configuration status reports that includes, at a minimum:</p> <ul style="list-style-type: none"> a. Current status of all hardware, system and scientific software b. Reason why an item is not currently operational. <p>A report is generated with summary information showing the site inventory of hardware, system and scientific software, and spares and consumables.</p> <p>Information generated at the SMC will be accessed for use in this test procedure.</p>	
SMC-8750#A	<p>This requirement is semi-automated at the SMC for this release, and is verified through analysis.</p> <p>The SMC shall have the capability to generate detailed and summary training reports, including, at a minimum:</p> <ul style="list-style-type: none"> a. Training programs b. Training course schedules c. Training course contents d. Training course locations e. Training attendees <p>A report is generated that has detailed and summary information on training programs, training course schedules, training course contents, training course locations, and training attendees.</p> <p>Information generated at the SMC will be accessed for use in this test procedure.</p>	

ESN-0760#A	<p>This requirement is verified through test.</p> <p>The ESN report generation function shall provide, on an interactive and scheduled basis, accounting, network configuration, fault and performance management information.</p> <p>The Tester tests that the system provides the capability to report information concerning accounting, network configuration, and fault and performance management.</p>
ESN-0770#A	<p>This requirement is verified through test.</p> <p>The ESN query capability shall generate ad hoc statistics and reports based on parameters entered.</p> <p>The Tester tests that the system provides the capability and use of a site report generator to produce communication reports based on the entered parameters.</p>
ESN-0775#A	<p>This requirement is verified through test.</p> <p>The ESN management service shall have the capability to redirect its reports to different devices such as console, disk or printer.</p> <p>The Tester displays the steps involved in producing standard or customized reports through use of the site report generator, from user request through output to selected media.</p>
SMC-8770#A	<p>This requirement is satisfied at the SMC, and this requirement is verified through test.</p> <p>The SMC shall have the capability to generate, at a minimum, detailed and summary reports showing the inventory of:</p> <ol style="list-style-type: none"> Hardware, system, and scientific software Spares and consumables <p>A report is generated composed of summary information showing the site inventory of hardware, system and scientific software, and spares and consumables.</p> <p>Information generated at the SMC will be accessed for use in this test procedure.</p>
SMC-8800#A	<p>This requirement is performed at the SMC using the office automation tools. This requirement is verified through test.</p> <p>The SMC shall have the capability to generate detailed and summary reports indicating the overall performance of the ECS. At a minimum, they include:</p> <ol style="list-style-type: none"> Scheduled versus actual data collection, processing, retrieval, and delivery of routine data Scheduled versus actual data collection, processing, retrieval, and delivery of user requested data Reason(s) for failure to meet schedules Quality of the data Ground operations event execution Number of interactive user requests and timeliness of response User feedback <p>The SMC must have the capability to produce standard or customized reports through use of the site report generator, from user requests through output to selected media.</p> <p>Information generated at the SMC will be accessed for use in this test procedure.</p>

SMC-8820#A	<p>This requirement is partially complied with at the SMC for this release, and is verified through test.</p> <p>The SMC shall have the capability to generate detailed and summary reports indicating the product generation status made in processing, reprocessing, and storage of all standard products.</p> <p>The SMC must have the capability to produce standard or customized reports through use of the site report generator, from user requests through output to selected media.</p> <p>Information generated at the SMC will be accessed for use in this test procedure.</p>			
SMC-8840#A	<p>This requirement is performed at the SMC, and this requirement is verified through test.</p> <p>The SMC shall have the capability to generate detailed and summary reports indicating the performance of ground resources, including, at a minimum:</p> <ul style="list-style-type: none">a. Resource availabilityb. Reason for down timec. Resource utilizationd. Ability of resource to meet performance criteriae. Short and long-term trend analysis and capacity planning results <p>A report is generated showing the site performance of ground resources, including resource availability, reason for down time, resource utilization, the ability of resource to meet the performance criteria, and short and long-term trend analysis and capacity planning results.</p> <p>Information generated at the SMC will be accessed for use in this test procedure.</p>			
SMC-8841#A	<p>This requirement is performed at the SMC using the office automation tools. This requirement is verified through test.</p> <p>The SMC shall have the capability to generate detailed and summary user feedback analysis reports describing the results of analyzing user satisfaction queries, including, at a minimum:</p> <ul style="list-style-type: none">a. User informationb. Type of transactionc. Satisfaction statisticsd. User recommendationse. SMC recommendations <p>The SMC must have the capability to produce standard or customized reports through use of the site report generator, from user requests through output to selected media.</p> <p>Information generated at the SMC will be accessed for use in this test procedure.</p>			
Test Inputs: Specifications for the as-built report generator for the LSM.				
Data Set Name	Data Set ID	File Name	Description	Version

Step-By-Step Procedures		
Step No.	Input Action / Expected Results	Pass / Fail / Comments
10	Tester: Verify that there is a fully operational site computer configuration.	
20	Tester: Verify that the site report generator and input data sets are available for access.	
30	Expected Results: Data sets representative of the full range of data types are available to be operated on by the report generator.	
40	Tester: Request use of the site report generator to produce a standard report.	
50	Expected Results: Display of steps involved in producing standard or customized reports through use of the site report generator, from user request through output to selected media.	
60	Tester: Define a report that generates detailed and summary information on training programs, training course schedules, training course contents, training course locations, and training attendees.	
70	Expected Results: Output includes a complete demonstration report that compares with the expected information.	
80	Tester: The output format is evaluated for correctness as well as readability and satisfactory presentation.	
90	Tester: Define a report that generates summary information showing the site inventory of hardware, system software, and spares and consumables.	
100	Expected Results: Output includes a complete demonstration report .	
110	Tester: The output format is evaluated for correctness as well as readability and satisfactory presentation.	
180	Tester: Define a report that generates information showing the site fault management reports describing the fault management of ground resources, including, fault type and description, time of occurrence of fault, effect on system, status of fault resolution, and fault statistics.	
190	Expected Results: Output includes a complete demonstration report .	
200	Tester: The output format is evaluated for correctness as well as readability and satisfactory presentation.	
240	Tester: Each of the previous report demonstrations is evaluated for adherence to report format and content specifications.	
250	Expected Results: The outputs include completed demonstration reports that compare expected versus actual outputs.	

Data Reduction and Analysis Steps:

A fully operational SMC computer configuration is required, ready to produce the specified reports including input data sets that are representative of nominal and special cases for each of the required report formats.

A. Evaluating report capabilities include generation of:

1. a functional allocation report giving the current allocation of ground segment functions;
2. summary configuration status reports;
3. summary training reports;
4. hardware and system software reports;
5. spares and consumables reports;
6. fault management reports.

Signature:**Date:**

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9. Push Scenario Group

The Push Scenario Group is not applicable to the EOC Volume. Refer to the Release A System Acceptance Test Procedures for the ECS Project, Volumes 2, 4, and 5 (GSFC, LaRC, and EDC DAACs, respectively) for Push procedures.

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10. Pull Scenario Group

The Pull Scenario Group is not applicable to the EOC Volume. Refer to the Release A System Acceptance Test Procedures for the ECS Project, Volumes 2, 4, and 5 (GSFC, LaRC, and EDC DAACs, respectively) for Pull procedures.

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11. Flight Operations Scenario Group

As a result of ECS test consolidation, procedures for the Flight Operations Scenario Group, which verifies core FOS functionality, have been integrated into the Release A Flight Operations Segment (FOS) Integration & Test Procedures for the ECS Project (DID 322).

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12. End-to-End Scenario Group

The End-to-End Scenario Group verifies EOC interfaces with other ECS sites and EOC system-level capabilities for Release A. EOC interfaces with the SMC and GSFC DAAC are confirmed. System-level capabilities include supporting verification activities during all life cycle phases are verified.

The overall objective of the end-to-end scenario group is to demonstrate that the ECS, as a 'whole', operates properly and can provide the full range of required functional capabilities for Release A.

12.1 Multi-Site Intercommunications and Interoperations Scenario

This scenario confirms the capability of the EOC to communicate with other ECS sites. Message traffic to/from the EOC and the EDC DAAC, and also between the EOC and the SMC, are verified.

12.1.1 Inter-Site Message Sequence

This sequence verifies the basic connectivity between the EOC and SMC and also between the EOC and GSFC DAAC. The EOC transmits messages to the SMC and GSFC DAAC, which acknowledge message receipt. Similarly, the EOC receives and acknowledges messages sent by the SMC and GSFC DAAC.

Configuration: The system configuration needed to perform this sequence of tests are as follows: Real-Time Server, Data Server, Multicast Server, CSS Server, MSS Server, FOT Workstation, IOT Workstation, MSS Workstation, and ISS equipment. Refer to Table 7-2 and Table 7-3 for additional detail.

External Interfaces: The external interfaces (i.e. other ECS sites and data sources) needed for this sequence (both real and simulated) are listed:

GSFC DAAC

SMC

Operator Position(s): There are no operator positions from the ECS Maintenance and Operations Position Descriptions document (607/OP2) needed to support this sequence. However, EOC Testers at the EOC are utilized.

Operational Scenario(s): There are no operations scenarios taken from the Operations Scenarios for the ECS Project: Release-A (605/OP1), used during this sequence of tests.

Test Dependencies: The following table identifies the test procedure(s) in a sequence of tests that should be run prior to or concurrently with a sequence or test procedure.

Test Procedure No.	Site/Procedure No.	Comments
A120110.020\$F	A120110.020\$G A120110.020\$S	Concurrent.

12.1.1.1 Inter-DAAC and DAAC-SMC Communications

TEST Procedure No.: A120110.020\$F		Date Executed:		Test Conductor :	
Title: Inter-DAAC and DAAC-SMC Communications					
Objective: This procedure tests the capability of the EOC to sequentially send messages to the GSFC DAAC and the SMC. The capability of the EOC to receive and process acknowledgments of message receipt is also verified. In addition, the EOC sends messages to the GSFC DAAC and SMC and receives acknowledgments of message receipt in return.					
Requirements		Acceptance Criteria			
EOSD0730#A		This requirement is verified through test. Each ECS element shall be capable of verifying the fidelity of the ECS element interface to: a. Other ECS elements at any time during the lifetime of the ECS b. Entities external to ECS at any time during the lifetime of the ECS During the test, the tester accesses the E-Mail and kFTP clients and sends an E-Mail message and planning, scheduling, and directive data files to the GSFC DAAC and SMC. Acknowledgments of message receipt are then received and processed. The EOC also receives E-Mail and planning, scheduling and directive data files from the GSFC DAAC and SMC and responds with acknowledgments of message receipt. This test procedure does not verify item b of this requirement.			
Test Inputs:					
Data Set Name	Data Set ID	File Name	Description	Version	
PLANNING_001	TBD	TBD	TBD	1	
SCHEDULE_001	TBD	TBD	TBD	1	
DIRECTIVE_001	TBD	TBD	TBD	1	
EMAIL_001	TBD	TBD	TBD	1	

Step-By-Step Procedures		
Step No.	Input Action / Expected Results	Pass / Fail / Comments
	EOC Sends E-Mail Messages to GSFC DAAC	
10	EOC Tester: Coordinate E-Mail transfer with GSFC DAAC and SMC.	
20	EOC Tester: Access Communications Server and invoke E-Mail client.	
50	EOC Tester: Specify E-Mail address at GSFC DAAC to which message is to be sent. Specify subject and body of message to be sent. Send E-Mail message to GSFC DAAC.	
60	Expected Results: GSFC DAAC receives the E-Mail message.	
	EOC Sends E-Mail Messages to SMC	
70	EOC Tester: Specify E-Mail address at SMC to which message is to be sent. Specify subject and body of message to be sent. Send E-Mail message to SMC.	
80	Expected Results: SMC receives the E-Mail message.	
110	EOC Tester: Verify that the E-Mail logs reflect the transmission of E-Mail message to GSFC DAAC and receipt of message acknowledgment.	
120	Expected Results: E-Mail logs must verify message transmission and receipt of acknowledgment.	
150	EOC Tester: Verify that the E-Mail logs reflect the transmission of E-Mail message to the SMC and receipt of message acknowledgment.	
160	Expected Results: E-Mail logs must verify message transmission and receipt of acknowledgment.	
	EOC Sends Files to GSFC DAAC via kFTP	
190	EOC Tester: Coordinate kFTP transfer with GSFC DAAC and SMC.	
200	EOC Tester: Access Communications Server and invoke kFTP client.	
260	EOC Tester: Establish kFTP connectivity with the GSFC DAAC.	
270	EOC Tester: Specify kFTP destination at GSFC DAAC to which Planning, Scheduling, and Directive data files are sent.	
280	EOC Tester: kFTP Planning and Scheduling data files to GSFC DAAC.	
290	EOC Tester: kFTP Directive data file to GSFC DAAC.	
300	Expected Results: Message stating the transfer of the Planning, Scheduling, and Directive data files to the GSFC DAAC.	
	EOC Sends Files to SMC via kFTP	
310	EOC Tester: Establish kFTP connectivity with the SMC.	
320	EOC Tester: Specify kFTP destination at the SMC to which Planning, Scheduling, and Directive data files are sent.	

330	EOC Tester: kFTP Planning and Scheduling data files to the SMC.	
340	EOC Tester: kFTP Directive data file to the SMC.	
350	Expected Results: Message stating the transfer of the Planning, Scheduling, and Directive data files to the SMC.	
	EOC Receives E-Mail Messages from SMC	
410	EOC Tester: Coordinate E-Mail transfer with the SMC.	
420	EOC Tester: Receive E-Mail message from the SMC.	
430	Expected Results: E-Mail logs must verify receipt of E-Mail message from the SMC and transmission of message receipt acknowledgment to the SMC.	
	EOC Receives kFTP Files from SMC	
440	EOC Tester: Coordinate kFTP transfer with the SMC.	
450	EOC Tester: Access Communications Server and invoke kFTP client.	
460	EOC Tester: Establish kFTP connectivity with the SMC.	
470	Expected Results: Receipt of Planning, Scheduling, and Directive data files from the SMC.	
480	EOC Tester: Verify that the kFTP logs reflect the receipt of the Planning, Scheduling, and Directive data files from the SMC and the transmission of the message receipt acknowledgment to the SMC.	
	EOC Receives E-Mail Messages from GSFC DAAC	
490	EOC Tester: Coordinate E-Mail transfer with the GSFC DAAC.	
500	EOC Tester: Receive E-Mail message from the GSFC DAAC.	
510	Expected Results: E-Mail logs must verify receipt of E-Mail message from the GSFC DAAC and transmission of message receipt acknowledgment to the GSFC DAAC.	
	EOC Receives kFTP Files from GSFC DAAC	
520	EOC Tester: Coordinate kFTP transfer with the GSFC DAAC.	
530	EOC Tester: Access Communications Server and invoke kFTP client.	
540	EOC Tester: Establish kFTP connectivity with the GSFC DAAC.	
550	Expected Results: Receipt of Planning, Scheduling, and Directive data files from the GSFC DAAC.	
560	EOC Tester: Verify that the kFTP logs reflect the receipt of the Planning, Scheduling, and Directive data files from the GSFC DAAC and the transmission of the message receipt acknowledgment to the GSFC DAAC.	

Data Reduction and Analysis Steps:

A. The following materials must be secured for analysis at the end of the procedure:

1. E-Mail Log Printout
2. Administrator Log Printout of kFTP Activities.

B. Analysis of the E-Mail Log Printout must verify that all E-Mail activities are completed to required specifications.

C. Compare messages received to messages sent. Email transmissions must verify that the integrity of the messages is consistent before and after transmission.

D. Analysis of kFTP Log Printout must verify that the files are transferred to the required directory without corruption.

Signature:

Date:

12.1.2 Multi-Site System Management Sequence

This sequence does not apply to the EOC Volume of the Acceptance Test Procedures document for Release A.

12.2 TRMM Mission Support Scenario

This scenario does not apply to the EOC Volume of the Acceptance Test Procedures document for Release A.

12.3 AM-1 End-to-End Scenario

This scenario does not apply to the EOC Volume of the Acceptance Test Procedures document for Release A.

12.4 Science Data Access and Interoperability Scenario

This scenario does not apply to the EOC Volume of the Acceptance Test Procedures document for Release A.

12.5 System Performance Scenario

The System Performance Scenario verifies overall ECS capabilities. The capability of the EOC to perform basic Release A functions and to support testing during all life cycle phases are confirmed.

12.5.1 Data Ingest, Data Server and Data Distribution Performance Sequence

This sequence does not apply to the EOC Volume of the Acceptance Test Procedures document for Release A.

12.5.2 System Response Time Performance Sequence

This sequence does not apply to the EOC Volume of the Acceptance Test Procedures document for Release A.

12.5.3 ECS Sizing, Evolution, and Growth Sequence

This sequence does not apply to the EOC Volume of the Acceptance Test Procedures document for Release A.

12.5.4 ECS Testability and Overall Capabilities Sequence

The ECS Overall Capabilities Sequence verifies that the EOC can perform its basic functions including planning, scheduling, command, and control. Analyses are prepared to verify overall EOC capabilities and the capability of the EOC to be tested during all phases of development, launch, and operations.

Configuration: No hardware is required to perform this sequence.

External Interfaces: There are no external interfaces needed to perform this sequence of tests.

Operator Positions: No operator positions are needed to perform this sequence.

Operational Scenario: There are no operational scenarios applicable to this sequence.

Test Dependencies: The following table identifies the test procedure(s) in a sequence of tests that should be run prior to or concurrently with a sequence or test procedure.

Test Procedure No.	Site/Procedure No.	Comments
A120640.010\$F	A080180.030\$F TLM-2000A (FOS I&T Procedures, DID 322) RCM-2010A (FOS I&T Procedures, DID 322) INT-2020A (FOS I&T Procedures, DID 322)	Prior
A120640.020\$F	INT-2000A (FOS I&T Procedures, DID 322) INT-2010A (FOS I&T Procedures, DID 322) INT-2020A (FOS I&T Procedures, DID 322)	Prior
A120640.030\$F	FOS I&T Procedures (FOS I&T Procedures, DID 322)	Prior

12.5.4.1 Test Support in an Operational DAAC

TEST Procedure No.: A120640.010\$F		Date Executed:		Test Conductor:	
Title: Test Support in an Operational DAAC					
Objective: This test procedure verifies the EOC's capabilities to support end-to-end test activities including system testing of the interfaces between the EOC and EDOS, and between the EOC and NCC.					
Requirements		Acceptance Criteria			
FOS-0025#A		This requirement is verified through demonstration. The FOS shall provide a test mode of operation that does not interfere with ongoing operations, and which supports independent element and subsystem tests, end-to-end tests, and integration and verification activities occurring during at a minimum: a. Spacecraft and instrument integration and test b. Pre-launch c. Upgrades and enhancements The EOC must be capable of preparing AM-1 commands for transmission to EDOS, receiving telemetry data from EDOS, preparing Ground Control Message (GCM) Requests (GCMRs) for transmission to NCC, and receiving GCM Status and Disposition messages from NCC. These capabilities are verified in test procedure A080180.030\$F and in applicable test procedures contained in the FOS I&T Procedures (DID 322) (TLM 2000A, RCM 2010A, and INT 2020A).			
EOSD0760#A		This requirement is verified through demonstration. Each ECS element shall support end-to-end EOS system testing and fault isolation. The EOC must be capable of preparing AM-1 commands for transmission to EDOS, receiving telemetry data from EDOS, preparing Ground Control Message (GCM) Requests (GCMRs) for transmission to NCC, and receiving GCM Status and Disposition messages from NCC. These capabilities are verified in test procedure A080180.030\$F and in applicable test procedures contained in the FOS I&T Procedures document (DID 322) (TLM-2000A, RCM-2010A, and INT-2020A). This test procedure does not verify fault isolation.			
EOSD0800#A		This requirement is verified through demonstration. Each ECS element shall be capable of supporting end-to-end test and verification activities of the EOS program including during the pre-launch, spacecraft verification, and instrument verification phases. The EOC must be capable of preparing AM-1 commands for transmission to EDOS, receiving telemetry data from EDOS, preparing Ground Control Message (GCM) Requests (GCMRs) for transmission to NCC, and receiving GCM Status and Disposition messages from NCC. These capabilities are verified in test procedure A080180.030\$F and in applicable test procedures contained in the FOS I&T Procedures document (DID 322) (TLM-2000A, RCM-2010A, and INT-2020A).			
Test Inputs: Results of test procedure A080180.030\$F, which is part of the System Management Scenario Group of these Acceptance Test Procedures, and test procedures TLM-2000A, RCM-2010A, and INT-2020A, which are part of the FOS I&T Procedures.					
Data Set Name	Data Set ID	File Name	Description	Version	
None.					

Step-By-Step Procedures		
Step No.	Input Action / Expected Results	Pass / Fail / Comments
10	EOC Tester: Execute test procedure A080180.030\$F, which is contained in this Acceptance Test Procedures Document (DID 411) and test procedures TLM-2000A, RCM-2010A, and INT-2020A, which are contained in the FOS I&T Procedures document (DID 322).	
20	Expected Results: Test procedures A080180.030\$F, TLM-2000A, RCM-2010A, and INT-2020A verify that the EOC is capable of preparing AM-1 commands for transmission to EDOS, receiving telemetry data from EDOS, preparing Ground Control Message (GCM) Requests (GCMRs) for transmission to NCC, and receiving GCM Status and Disposition messages from NCC.	
Data Reduction and Analysis Steps: Review the results of test procedures A080180.030\$F, TLM-2000A, RCM-2010A, and INT-2020A.		
Signature:		Date:

12.5.4.2 Support of Life Cycle Testing

TEST Procedure No.: A120640.020\$F		Date Executed:	Test Conductor:	
Title: Support of Life Cycle Testing				
Objective: This test procedure verifies, through analysis of previous test results, that the EOC can support instrument integration activities and life cycle testing.				
Requirements		Acceptance Criteria		
EOC-8285#A		This requirement is verified through analysis. The EOC shall support instrument integration activities associated with the spacecraft prior to launch. The ISTs must be able to perform required ECS functions, including planning and scheduling and analysis of telemetry data. These capabilities are verified in applicable test procedures contained in the FOS I&T Procedures document (DID 322) (INT-2000A, INT-2010A, and INT-2020A).		
EOSD0630#A		This requirement is verified through analysis. ECS shall be capable of simultaneously supporting the Independent Verification and Validation (IV&V) activities and ECS development activities, both before and after flight operations begin. During the ECS development phase, the ECS project must be able to provide ECS information to, and coordinate with, the IV&V contractor.		
Test Inputs: Results of Test Procedures INT-2000A, INT-2010A, and INT-2020A, which are part of the FOS I&T Procedures.				
Data Set Name	Data Set ID	File Name	Description	Version
None.				

Step-By-Step Procedures		
Step No.	Input Action / Expected Results	Pass / Fail / Comments
10	EOC Tester: Execute test procedures INT-2000A, INT-2010A, and INT-2020A, which are contained in the FOS I&T Procedures document (DID 322).	
20	Expected Results: Test procedures INT-2000A, INT-2010A, and INT-2020A verify that ISTs are provided with the capabilities to perform required ECS functions, including planning and scheduling and analysis of telemetry data.	
30	Expected Results: The Acceptance Test Organization has provided the IV&V contractor with ECS technical and scheduling information, and answered IV&V queries, on the RTM requirements tool, ECS test plans and procedures, and EOSDIS integration activities.	
Data Reduction and Analysis Steps: Review the results of test procedures INT-2000A, INT-2010A, and INT-2020A.		
Witness Signature:		Date:

12.5.4.3 ECS Overall Capabilities

TEST Procedure No.: A120640.030\$F	Date Executed:	Test Conductor:
Title: ECS Overall Capabilities		
Objective: The ECS Overall Capabilities procedure consolidates requirements that specify broad ECS capabilities. These requirements are too broad to be verified through the execution of a single test or demonstration. In this procedure, the results of previously executed procedures are reviewed and analyzed to verify that the ECS is capable of performing all Release A functionality.		

Requirements		Acceptance Criteria		
EOSD0500#A		<p>This requirement is verified through analysis.</p> <p>ECS shall perform the following major functions:</p> <ul style="list-style-type: none">a. EOS Mission Planning and Schedulingb. EOS Mission Operationsc. Command and Controld. Communications and Networkinge. Data Inputf. Data Processingg. Data Storageh. Data Distributioni. Information Managementj. End-to-End Fault Managementk. System Management <p>Analysis of the results of core FOS functionality testing defined in the FOS I&T Procedures document (DID 322) must conclude that the EOC is capable of performing AM-1 mission planning and scheduling, commanding, telemetry processing, and analysis functions to the extent required by Release A.</p> <p>This procedure does not verify items d, e, f, g, h, i, j, and k of this requirement.</p>		
FOS-0040#A		<p>This requirement is verified through analysis.</p> <p>The FOS shall be capable of supporting flight operations of the EOS spacecraft and instruments as listed in Table D-1 that are controlled from GSFC.</p> <p>Analysis of Core FOS functionality procedures contained in the FOS I&T Procedures document (DID 322) must conclude that the EOC is capable of supporting flight operations of the AM-1 spacecraft and its instruments.</p>		
Test Inputs:				
Data Set Name	Data Set ID	File Name	Description	Version
None.				

Step-By-Step Procedures		
Step No.	Input Action / Expected Results	Pass / Fail / Comments
10	EOC Tester: Execute test procedures contained in the FOS I&T Procedures document (DID 322).	
20	Expected Results: Test procedures contained in the FOS I&T Procedures document (DID 322) verify that the EOC is capable of supporting flight operations of the AM-1 spacecraft and its instruments, including mission planning and scheduling, commanding, telemetry processing, and analysis.	
Data Reduction and Analysis Steps: Review the results of FOS acceptance testing.		
Witness Signature:		Date:

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Appendix A. Test Procedure Format

The following contain a test procedure template, with annotations describing what each item contains.

A.1 Scenario Test Group

Each Scenario Group begins with an overview paragraph describing the Scenario Group.

A.1.1 Scenario Title

Each Scenario begins with a paragraph summarizing the Scenario.

A.1.1.1 Sequence Title

Each Sequence has a brief summary describing this sequence of tests.

Configuration: The subsystems needed to perform this sequence of tests are listed here.

External Interfaces: The external interfaces (i.e. other ECS sites and data sources) needed for a sequence (both real and simulated) are listed.

Operator Position(s): The operator positions from the ECS Maintenance and Operations Position Descriptions document (607/OP2) needed to support a sequence are listed.

Operational Scenario(s): The operations scenarios, taken from the Operations Scenarios for the ECS Project: Release-A document (605/OP1), that were used to develop tests in this sequence of tests are listed.

Test Dependencies: This table identifies the test procedure(s) in a sequence of tests that should be run prior to or concurrently with a sequence or test procedure.

Test Procedure No.	Site/Procedure No.	Comments
Insert proc. # for this volume	List site/proc. #	Prior or Concurrent

A.1.1.1.1 Procedure Title

TEST Procedure No.: A unique #, taken from the Acceptance Test Plan, used to identify the test in RTM	Date Executed: Filled in on the date the formal test is run	Test Conductor The test conductor for this site		
Title: The title of the test				
Objective: A brief statement of the objective of this procedure, taken from the ATP test case description.				
Requirements		Acceptance Criteria		
Requirement i.d. from RTM (i.e. DADS1700#A)		<p>For each requirement verified in a procedure the acceptance criteria contains the following information in the order shown below:</p> <p>a. The Verification method (inspection, analysis, demonstration or test)</p> <p>b. The text of the requirement</p> <p>c. A brief description of HOW the requirement is verified in the test procedure. This description may specify certain functions that the system must perform, specifications or standards that must be complied with, or performance criteria (such as responses times or throughput) that must be met.</p>		
Test Inputs: For each procedure, specific test inputs are identified and listed in the table below				
Data Set Name	Data Set ID	File Name	Description	Version
Descriptive name	data set identifier	name of the physical file containing the data	a brief description of what is in the file	A version control number

Step-By-Step Procedures		
Step No.	Input Action / Expected Results	Pass / Fail / Comments
10	Contains a description of a particular input, or action to be taken by a tester or operator, OR an expected result from the system under test.	Brief explanation of why a step may have failed, or a deviation from the written procedures, and a reference to an NCR, if applicable.
20		
30		
etc.		
Data Reduction and Analysis Steps: <p>This section describes the method used for data reduction and includes instructions necessary to complete the analysis of test results. If applicable, the XRunner and LoadRunner reports generated during script execution are also described in this section. A list of all test outputs that need to be secured after testing (i.e. screen dumps, system logs, etc.) is also included here.</p>		
Signature: Witness or testers signature		Date: Date the test is signed off

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Abbreviations and Acronyms

ADC	Affiliated Data Center
AI&T	Algorithm Integration and Test
AITT	Algorithm Integration and Test Team
AM-1	EOS AM Project (morning spacecraft series)
API	application programming interface
ARP	address resolution protocols
ASF	Alaska SAR Facility (DAAC)
ASTER	Advanced Spaceborne Thermal Emission and Reflection Radiometer (formerly ITIR)
ATC	Actual Time Command
ATP	Acceptance Test Plan
ATPR	Acceptance Test Procedures
ATT	Acceptance Test Team
AVHRR	Advanced Very High Resolution Radiometer
BGP	boundary gateway protocol
CASE	Computer Aided Software Engineering
CAST	Computer Aided Software Test
CCR	Configuration Change Request
CCSDS	Consultative Committee for Space Data Systems
CDRL	Contract Data Requirements List
CERES	Clouds and Earth's Radiant Energy System
CIESIN	Consortium for International Earth Science Information Network
CM	Configuration Management
cmi	continuous measurable improvement
CMO	Configuration Management Office
COTR	Contracting Officer's Technical Representative

COTS	Commercial Off-The-Shelf (hardware or software)
CSR	Consent to Ship Review
CZCS	Coastal Zone Color Scanner
DAAC	Distributed Active Archive Center
DAS	Daily Activity Schedule
DCN	Document Change Notice
DHF	Data Handling Facility
DID	Data Item Description
DIT	Data Ingest Technician
DIF	Data Interface Facility (EDOS);
DSA	directory service agent
DSN	Deep Space Network
EAS	ECS Advertising Service
Ecom	ECS Communications
ECS	EOSDIS Core System
EDC	Expected ResultOS Data Center (DAAC)
EDF	ECS Development Facility
EDHS	ECS Data Handling System
EDOS	EOS Data and Operations System
EGS	EOS Ground System
EMC	Enterprise Monitoring and Coordination
EOC	EOS Operations Center
EOS	Earth Observing System
EOSDIS	Earth Observing System Data and Information System
ERBE	Earth Radiation Budget Experiment
EROS	Earth Resources Observation System
ESDIS	Earth Science Data and Information System
ESN	ECS Science Network
ETS	EOSDIS Test System

F&PRS	Functional and Performance Requirement Specification
FDF	Flight Dynamics Facility
FOS	Flight Operations System
FOT	Flight Operations Team
FTP	File Transfer Protocol
GATT	Government Acceptance Test Team
GCDIS	Global Change Data Information System
GDS	ground data system
GN	Ground Network
GPCP	Global Precipitation Climatology Project
GPI	GOES Precipitation Index
GSFC	Goddard Space Flight Center
GUI	Graphic User Interface
GV	TRMM Ground Verification
HTML	Hyper-Text Markup Language
I/O	Input/Output
I&T	Integration and Test
ATO	Acceptance Test Organization
ICMP	Internet Control Message Protocol
IDR	Incremental Design Review
IGS	International Ground Station
IMS	Information Management System
IP	Internet Protocol
IR	Interim Release
IRD	Interface Requirements Document
ISCCP	International Satellite Cloud Climatology Project
ISS	Information Subsystem
IST	Instrument Support Terminal
IV&V	Independent Verification and Validation

JPL	Jet Propulsion Laboratory
L0 - L4	Level 0 through Level 4 data
L0R	Level 0 Reformatted
L-7	Landsat 7
LAN	Local Area Network
LaRC	Langley Research Center
LIS	Lighting Imaging Sensor
LSM	Local System Manangement
LTIP	Long Term Instrument Plan
LTSP	Long Term Spacecraft Plan
M&O	Maintenance and Operations
MDT	mean down time
MIB	Management Information Base
MIME	Multi-purpose Internet Mail Extension
MISR	Multi-Angle Imaging SpectroRadiometer
MITI	Ministry of International Trade and Industry (Japan)
MODIS	Moderate Resolution Imaging Spectrometer
MOPITT	Measurements of Pollution in the Troposphere
MSFC	Marshall Space Flight Center
MSS	Management Subsystem
NASA	National Aeronautics and Space Administration
NASCOM	NASA Communications
NCC	Network Communication Center
NCDC	National Climatic Data Center
NCR	Non Conformance Report
NGDC	National Geophysical Data Center
NLDN	National Lightning Detection Network
NMC	National Meteorological Center (NOAA)
NOAA	National Oceanic and Atmospheric Administration

NODC	National Oceanic Data Center
NOLAN	Nascom Operational Local Area Network
NRCA	Nonconformance Reporting and Corrective Action
NSI	NASA Science Internet
NSIDC	National Snow and Ice Data Center
OA	Office Automation
ODC	Other Data Center
OJT	On-the-Job Training
ORNL	Oak Ridge National Laboratory
OSI	Open Systems Interconnection
OSPF	Open Shortest Path First (routing protocol)
OTD	Optical Transient Detector
PA	Product Assurance
PDPS	Product Development and Processing System
PDR	Preliminary Design Review
PDS	Production Data Set
PR	Precipitation Radar
QA	Quality Assurance
QO	Quality Office
RIP	Routing Information Protocol (207)
RMA	Reliability, Maintainability, Availability
RRR	Release Readiness Review
RTM	Requirements & Traceability Management
S/C	spacecraft
SAA	Satellite Active Archive
SAGE	Stratospheric Aerosol and Gas Experiment
SAR	Synthetic Aperture Radar
SCC	Spacecraft Computer
SCF	Science Computing Facility

SDPF	Sensor Data Processing Facility
SDR	System Design Review
SI&T	System Integration and Test Organization
SMC	System Management Center
SME	Subject Matter Expert
SMMR	Scanning Multichannel Microwave Radiometer
SNMP	Simple Network Management Protocol
SORR	Segment Operational Readiness Review
SSM/I	Special Sensor Microwave/Imager
SSR	Solid State Recorder
SWE	Snow Water Equivalent
TB	tera-byte
TDRSS	Tracking and Data Relay Satellite System
TMI	TRMM Microwave Imager
TOMS	Total Ozone Mapping Spectrometer
TOO	Target of Opportunity
TOVS	Television Infrared Observing Satellite (TIOS) Operational Vertical Sounder
TRMM	Tropical Rainfall Measurement Mission
TRR	Test Readiness Review
TSDIS	TRMM Science Data and Information Systems
TSS	TDRSS Service Session
V0	Version 0
VIRS	Visible Infrared Scanner
WAN	Wide Area Network
WOTS	Wallops Orbital Tracking Station

Glossary

Analysis	Technical or mathematical evaluation based on calculation, interpolation, or other analytical methods. Analysis involves the processing of accumulated data obtained from other verification methods.
Consent to Ship	Review to determine the readiness of a release for transition sites Review (CSR) for integration testing.
Critical Design	A detailed review of the element/segment-level design, including Review (CDR) such details as Program Design Language (PDL) for key software modules, and element interfaces associated with a release.
Demonstration	Observation of the functional operation of the verification item in a controlled environment to yield qualitative results without the use of elaborate instrumentation or special test equipment.
Incremental Design	Review conducted to evaluate segment designs associated with a Review (IDR) release.
Inspection	The visual, manual examination of the verification item and comparison to the applicable requirement or other compliance documentation, such as engineering drawings.
Scenario Group	A collection of scenarios that form one of the broadest functional subdivisions of the system.
Scenario	A functional subdivision of a Scenario Group which is designed and executed independently.
Sequence	A subdivision of a scenario which is designed to verify a number of functionally related requirements
Release Readiness	Conducted at the ECS system level for a GSFC Project Review Review (RRR) Team upon completion of release acceptance testing. The IATO leads the RRR to determine, with the GATT and the COTR, if the release is ready to be delivered, installed, and incorporated into the operational system.
Test	A procedure or action taken to determine under real or simulated conditions the capabilities, limitations, characteristics, effectiveness, reliability, or suitability of a material device, system, or method.
Test Case	A relatively small grouping of requirements that form the building blocks of a sequence.
Test Procedure	A detailed, step-by-step test of a logically related group of requirements

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